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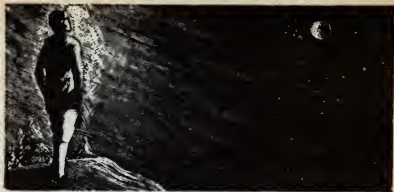
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AS I SEE TOMORROW...

By

ROBERT HEINLEIN

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Uncertainty

By JOHN W. CAMPBELL, JR.

We are sure that our readers will be delighted to see the name of Mr. Campbell again on our pages. We wish to tell nothing about the story, but we can promise that it will be startling, and will have the characteristic touch of the distinguished author.

CHAPTER I

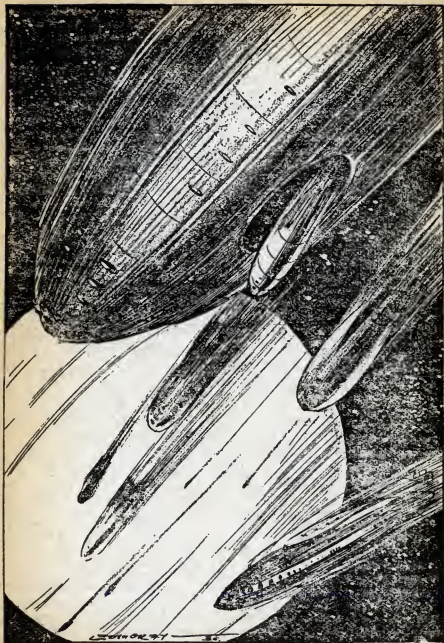
PATROL Cruiser "I. P.-T 247" circling out toward Pluto on leisurely inspection tour to visit the outpost miners there, was in no hurry at all as she loafed along. Her six-man crew was taking it very easy, and easy meant two-man watches, and low speed, to watch for the instrument panel and attend ship into the bargain.

She was about thirty million miles off Pluto, just beginning to get in touch with some of the larger mining stations out there, when Buck Kendall's turn at the controls came along. Buck Kendall was one of life's little jokes. When nature made him, she was absent minded. Buck stood six feet two in his stocking feet, with his usual slight stoop in operation. When he forgot, and stood up straight, he loomed about two inches higher. He had the body and muscles of a dock navvy, which Nature started out to make. Then she forgot and added something of the same stuff she put in Sir Francis Drake. Maybe that made Old Nature nervous, and she started adding different things. At any rate, Kendall, as finally turned out, had a brain that put him in the first rank of scientists—when he felt like it—the general constitution of an ostrich and a flair for gambling.

The present position was due to such a gamble. An IP man, a friend of his, had made the mistake of betting him a thousand dollars he wouldn't get beyond a Captain's bars in the Patrol. Kendall had liked the idea anyway, and adding a bit of a bet to it made it irresistible. So, being a very particular kind of a fool, the glorious kind which old Nature turns out now and then, he left a five million dollar estate on Long Island, Terra, that same evening, and joined up in the Patrol. The Sir Francis Drake strain had immediately come forth—and Kendall was having the time of his life. In a six-man cruiser, his real work in the Interplanetary Patrol had started. He was still in it—but it was his command now, and a blue circle on his left sleeve gave his lieutenant's rank.

BUCK KENDALL had immediately proceeded to enlist in his command the IP man who had made the mistaken bet, and Rad Cole was on duty with him now. Cole was the technician of the T-247. His rank as Technical Engineer was practically equivalent to Kendall's circle-rank, which made the two more comfortable together.

Cole was listening carefully to the signals coming through from Pluto.



"That," he decided, "sounds like Tad Nichols' fist. You can recognize that broken down truck-horse trot of his on the key as far away as you can hear it.

"Is that what it is?" sighed Buck. "I thought it was static mushing him at first. What's he like?"

"Like all the other damn fools who come out two billion miles to scratch rock, as if there weren't enough already on the inner planets. He's got a rich platinum property. Sells ninety percent of his output to buy his power, and the other eleven percent for his clothes and food."

"He must be an efficient miner," suggested Kendal, "to maintain 101% production like that."

"No, but his bank account is. He's figured out that's the most economic level of production. If he produces less, he won't be able to pay for his heating power, and if he produces more, his operation power will burn up his bank account too fast."

"Hmmm—sensible way to figure. A man after my own heart. How does he plan to restock his bank account?"

"By mining on Mercury. He does it regularly—sort of a commuter. Out here his power bills eat it up. On Mercury he goes in for potassium, and sells the power he collects in cooling his dome, of course. He's a good miner, and the old fool can make money down there." Like any really skilled operator, Cole had been sending Morse messages while he talked. Now he sat quiet waiting for the reply, glancing at the chronometer.

"I take it he's not after money—just after fun," suggested Buck.

"Oh, no. He's after money," replied Cole gravely. "You ask him—he's going to make his eternal fortune yet

by striking a real bed of jovium, and then he'll retire."

"Oh, one of that kind."

"They all are," laughed Cole—"Eternal hope, and the rest of it." He listened a moment and went on. "But old Nichols is a first-grade engineer. He wouldn't be able to remake that bankroll every time if he wasn't. You'll see his Dome out there on Pluto—it's always the best on the planet. Tip-top shape. And he's a bit of an experimenter too. Ah—he's with us."

Nichol's ragged signals were coming through—or pounding through. They were worse than usual, and at first Kendall and Cole couldn't make them out. Then finally they got them in bursts. The man was excited, and his bad key-work made it worse. "—Randing stopped. They got him I think. He said—th—ship as big—a—nsport. Said it wa—eaded my—ay. Neutrons—on instruments—he's coming over the horizon—it's huge—war ship I think—register—instru—neutrons—" Abruptly the signals were blanked out completely.

COLE and Kendall sat frozen and stiff. Each looked at the other abruptly, then Kendall moved. From the receiver, he ripped out the recording coil, and instantly jammed it into the analyzer. He started it through once, then again, then again, at different tone settings, till he found a very shrill whine that seemed to clear up most of Nichols' bad key work. "T-247—T-247—Emergency. Emergency. Randing reports the—over his horizon. Huge—ip—reign manufacture. Almost spherical. Randing's stopped. They got him I think. He said the ship was as big as a transport. Said it was headed my way. Neutrons—ont—gister—instruments. I think

—is h—he's coming over the horizon. It's huge, and a war ship I think—register—instruments—neutrons."

Kendall's finger stabbed out at a button. Instantly the noise of the other men, wakened abruptly by the mild shocks, came from behind. Kendall swung to the controls, and Cole raced back to the engine room. The hundred foot ship shot suddenly forward under the thrust of her tail ion-rockets. A blue-red cloud formed slowly behind her and expanded. Talbot appeared, and silently took her over from Kendall. "Stations, men," snapped Kendall. "Emergency call from a miner of Pluto reporting a large armed vessel which attacked them." Kendall swung back, and eased himself against the thrusting acceleration of the over-powered little ship, toward the engine room. Cole was bending over his apparatus, making careful check-ups, closing weapon-circuits. No window gave view of space here, on the left was the tiny tender's pocket, on the right, above and below the great water tanks that fed the ion rockets, behind the rockets themselves. The tungsten metal walls were cold and grey under the sharp lights, the hunched bulks of the apparatus crowded the tiny room. Gigantic racked accumulators huddled in the corners. Martin and Garnet swung into position in the fighting-tanks just ahead of the power rooms, Canning slid rapidly through the engine room, oozed through a tiny door, and took up his position in the stern-chamber, seated half-over the great ion-rocket sheath.

"Ready in positions, Captain Kendall," called the war-pilot as the little green lights appeared on his board.

"Test discharges on maximum," ordered Kendall. He turned to Cole. "You start the automatic key?"

"Right, Captain."

"All ship-shape?"

"Right as can be. Accumulators at thirty-seven per cent, thanks to the loaf out here. They ought to pick up our signal back on Jupiter, he's nearest now. The station on Europa will get it."

"Talbot—we are only to investigate, if the ship is as reported. Have you seen any signs of her?"

"No sir, and the signals are blank."

"I'll work from here." Kendall took his position at the commanding control. Cole made way for him, and moved to the power board. One by one he tested the automatic doors, the pressure bulkheads. Kendall watched the instruments as one after another of the weapons were tested on momentary full discharge—titantic flames of five million volt protons. Then the ship thudded to the chatter of the Garnell rifles.

TENSELY the men watched the planet ahead, white, yet barely visible in the weak sunlight so far out. It was swimming slowly nearer as the tiny ship gathered speed.

Kendall cast a glance over his detector-instruments. The radio network was undisturbed, the magnetic and electric fields recognized only the slight disturbances occasioned by the planet itself. There was nothing, noth—

Five hundred miles away, a gigantic ship came into instantaneous being. Simultaneously, and instantaneously, the various detector systems howled their warnings. Kendall gasped as the thing appeared on his view screen, with the scale-lines below. The scale must be cock-eyed. They said the ship was fifteen hundred feet in diameter, and two thousand long!

"Retreat," ordered Kendall, "at maximum acceleration."

Talbot was already acting. The gyroscopes hummed in their castings, and the motors creaked. The T-247 spun on her axis, and abruptly the acceleration built up as the ion-rockets began to shudder. A faint smell of "heat" began to creep out of the converter. Immense "weight" built up, and pressed the men into their specially designed seats—

The gigantic ship across the way turned slowly, and seemed to stare at the T-247. Then it darted toward them at incredible speed till the poor little T-247 seemed to be standing still, as sailors say. The stranger was so gigantic now, the screens could not show all of him.

"God, Buck—he's going to take us!"

Simultaneously, the T-247 rolled, and from her broke every possible stream of destruction. The ion-rocket flames swirled abruptly toward her, the proton-guns whined their song of death in their housings, and the heavy pounding shudder of the Garnell guns racked the ship.

Strangely, Kendall suddenly noticed, there was a stillness in the ship. The guns and the rays were still going—but the little human sounds seemed abruptly gone.

"Talbot,—Garnet—" Only silence answered him. Cole looked across at him in sudden white-faced amazement.

"They're gone—" gasped Cole.

Kendall stood paralyzed for thirty seconds. Then suddenly he seemed to come to life. "Neutrons! Neutrons—and water tanks! Old Nichols was right—. "He turned to his friend. "Cole—the tender—quick." He darted a glance at the screen. The giant ship still lay alongside. A wash of ions was curling around her, splitting, and passing on. The pin-prick explosions of the

Garnell shells dotted space around her—but never on her.

Cole was already racing for the tender lock. In an instant Kendall piled in after him. The tiny ship, scarcely ten feet long, was powered for flights of only two hours acceleration, and had oxygen for but twenty-four hours for six men, seventy two hours for two men—maybe. The heavy door was slammed shut behind them, as Cole seated himself at the panel. He depressed a lever, and a sudden smooth push shot them away from the T-247:

"DON'T!" called Kendall sharply as Cole reached for the ion-rocket control. "Douse those lights!" The ship was dark in dark space. The lighted hull of the T-247 drifted away from the little tender—further and further till the giant ship on the far side became visible.

"Not a light—not a sign of fields in operation." Kendall said, unconsciously speaking softly. "This thing is so tiny, that it may escape their observation in the fields of the T-247 and Pluto down there. It's our only hope."

"What happened? How in the name of the planets did they kill those men without a sound, without a flash, and without even warning us, or injuring us?"

"Neutrons—don't you see?"

"Frankly, I don't. I'm no scientist—merely a technician. Neutrons aren't used in any process I've run across."

"Well, remember they're uncharged, tiny things. Small as protons, but without electric field. The result is they pass right through an ordinary atom without being stopped unless they make a direct hit. Tungsten, while it has a beautifully high melting point, is mostly open space, and a neutron just sails right through it, or any heavy atom. Light atoms stop neutrons better—there's less open

space in 'em. Hydrogen is best. Well—a man is made up mostly of light elements, and a man stops those neutrons—it isn't surprising it killed those other fellows invisibly, and without a sound."

"You mean they bathed that ship in neutrons?"

"Shot it full of 'em. Just like our proton guns, only sending neutrons."

"Well, why weren't we killed too?"

"Water stops neutrons," I said. Figure it out."

"The rocket-water tanks—all around us! Great masses of water—" gasped Cole. "That saved us?"

"Right. I wonder if they've spotted us."

THE stranger ship was moving slowly in relation to the T-247. Suddenly the motion changed, the stranger spun—and a giant lock appeared in her side, opened. The T-247 began to move, floated more and more rapidly straight for the lock. Her various weapons had stopped operating now, the hoppers of the Garnell guns exhausted, the charge of the accumulators aboard the ship down so low the proton guns had died out.

"Lord—they're taking the whole ship!"

"Say—Cole, is that any ship you ever heard of before? *I don't think that's just a pirate!*"

"Not a pirate—what then?"

"How'd he get inside our detector screens so fast? Watch—he'll either leave, or come after us—" The T-247 had settled inside the lock now, and the great metal door closed after it. The whole patrol ship had been swallowed by a giant. Kendall was sketching swiftly on a note-book, watching the vast ship closely, putting down a record of its lines, and formation. He

glanced up at it, and then down for a few more lines, and up at it—

The stranger ship abruptly dwindled. It dwindled with incredible speed, rushing off along the line of sight at an impossible velocity, and abruptly clicking out of sight, like an image on a movie-film that has been cut, and repaired after the scene that showed the final disappearance.

"Cole—Cole—did you get that? Did you see—do you understand what happened?" Kendall was excitedly shouting now.

"He missed us," Cole sighed. "It's a wonder—hanging out here in space, with the protector of the T-247's fields gone." "No, no, you asteroid—that's not it. *He went off faster than light itself!*"

"Eh—what? Faster than light? That can't be done—"

"He did it, I know he did. That's how he got inside our screens. He came inside faster than the warning message could relay back the information. Didn't you see him accelerate to an impossible speed in an impossible time? Didn't you see how he just vanished as he exceeded the speed of light, and stopped reflecting it? *That ship was no ship of this solar system!*"

"Where did he come from then?"

"God only knows, but it's a long, long way off."

CHAPTER II

THE IP-M-122 picked them up. The M-122 got out there two days later, in response to the calls the T-247 had sent out. As soon as she got within ten million miles of the little tender, she began getting Cole's signals, and within twelve hours had reached the tiny thing, located it, and picked it up.

Captain Jim Warren was in command, one of the old school commanders of the IP. He listened to Kendall's report, listened to Cole's tale—and radioed back a report of his own. Space pirates in a large ship had attacked the T-247, he said, and carried it away. He advised a close watch. On Pluto, his investigations disclosed nothing more than the fact that three mines had been raided, all platinum supplies taken, and the records and machinery removed.

The M-122 was a fifty man patrol cruiser, and Warren felt sure he could handle the menace alone, and hung around for over two weeks looking for it. He saw nothing, and no further reports came of attack. Again and again, Kendall tried to convince him this ship he was hunting was no mere space pirate, and again and again Warren grunted, and went on his way. He would not send in any report Kendall made out, because to do so would add his indorsement to that report. He would not take Kendall back, though that was well within his authority.

In fact, it was a full month before Kendall again set foot on any of the Minor Planets, and then it was Mars, the base of the M-122. Kendall, and Cole took passage immediately on an IP supply ship, and landed in New York six days later. At once, Kendall headed for Commander McLaurin's office. Buck Kendall, lieutenant of the IP, found he would have to make regular application to see McLaurin through a dozen intermediate officers.

By this time, Kendall was savagely determined to see McLaurin himself, and see him in the least possible time. Cole, too was beginning to believe in Kendall's assertion of the stranger ship's extra-systemic origin. As yet neither could understand the strange actions of the machine, its attack on

the Pluto mines, and the capture and theft of a patrol ship.

"There is," said Kendall angrily, "just one way to see McLaurin and see him quick. And, by God, I'm going to. Will you resign with me, Cole? I'll see him within a week then, I'll bet."

For a minute, Cole hesitated. Then he shook hands with his friend. "Today!" And that day it was. They resigned, together. Immediately, Buck Kendall got the machinery in motion for an interview, working now from the outside, pulling the strings with the weight of a hundred million dollar fortune. Even the IP officers had to pay a bit of attention when Bernard Kendall, multi-millionaire began talking and demanding things. Within a week, Kendall *did* see McLaurin.

At that time, McLaurin was fifty-three years old, his crisp hair still black as space, with scarcely a touch of the grey that appears in his more recent photographs. He stood six feet tall, a broad-shouldered, powerful man, his face grave with lines of intelligence and character. There was also a permanent narrowing of the eyes, from years under the blazing sun of space. But most of all, while those years in space had narrowed and set his eyes, they had not narrowed and set his mind. An infinitely finer character than old Jim Warren, his experience in space had taught him always to expect the unexpected, to understand the incomprehensible as being part of the unknown and incalculable properties of space and the worlds that swam in it. Besides the fine technical education he had started with, he had acquired a liberal education in mankind. When Buck Kendall, straight and powerful, came into his office with Cole, he recognized in him a character that would drive steadily and straight for

its goal. Also, he recognized behind the millionaire that had succeeded in pulling wires enough to see him, the scientist who had had more than one paper published "in an amateur way".

"Dr. Bernard Kendall?" he asked rising.

"Yes, sir. Late Buck Kendall, lieutenant of the IP. I quit and got Cole here to quit with me, so we could see you."

"Unusual tactics. I've had several men join up to get an interview with me," smiled McLaurin.

"Yes, I can imagine that, but we had to see you in a hurry. A hidebound old rascalion by the name of Jim Warren picked us up out by Pluto, floating around in a six-man tender. We made some reports to him, but he wouldn't believe, and he wouldn't send them through—so we had to send ourselves through. Sir, this system is about to be attacked by some extra-systemic race. The IP-T-247 was so attacked, her crew killed off, and the ship itself carried away."

"I got the report Captain Jim Warren sent through, stating it was a gang of space pirates. Now what makes you believe otherwise?"

"That ship that attacked us, attacked with a neutron gun, a gun that shot neutrons through the hull of our ship as easily as protons pass through open space. Those neutrons killed off four of the crew, and spared us only because we happened to be behind the water tanks. Masses of hydrogen will stop neutrons, so we lived, and escaped in the tender. The little tender, lightless, escaped their observation, and we were picked up. Now, when the 247 had been picked up, and locked into their ship, that ship started accelerating. It accelerated so fast along my line of sight that it just dwindled, and—vanished. It didn't vanish in dis-

tance, it vanished *because it exceeded the speed of light.*"

"Isn't that impossible?"

"Not at all. It can be done—if you can find some way of escaping from this space to do it. Now if you could cut across through a higher dimension, your *projection* in this dimension might easily exceed the speed of light. For instance, if I could cut directly through the earth, at a speed of one thousand miles an hour, my projection on the surface would go twelve thousand miles while I was going eight. Similarly, if you could cut *through* the four dimensional space instead of following its surface, you'd attain a speed greater than light."

"Might it not still be a space pirate? That's a lot easier to believe, even allowing your statement that he exceeded the speed of light."

"If you invented a neutron gun which could kill through tungsten walls without injuring anything within, a system of accelerating a ship that didn't affect the inhabitants of that ship, and a means of exceeding the speed of light, all within a few months of each other, would you become a pirate? I wouldn't, and I don't think any one else would. A pirate is a man who seeks adventure and relief from work. Given a means of exceeding the speed of light, I'd get all the adventure I wanted investigating other planets. If I didn't have a cent before, I'd have relief from work by selling it for a few hundred millions—and I'd sell it mighty easily too, for an invention like that is worth an incalculable sum. Tie to that the value of compensated acceleration, and no man's going to turn pirate. He can make more millions selling his inventions than he can make thousands turning pirate with them. So who'd turn pirate?"

"Right," nodded McLaurin. "I see

your point. Now before I'd accept your statements in re the 'speed of light' thing, I'd want opinions from some IP physicists."

"Then let's have a conference, because something's got to be done soon. I don't know why we haven't heard further from that fellow."

"Privately—we have," McLaurin said in a slightly worried tone. "He was detected by the instruments of every IP observatory I suspect. We got the reports but didn't know what to make of them. They indicated so many funny things, they were sent in as accidental misreadings of the instruments. But since *all* the observatories reported them, similar misreadings, at about the same times, that is with variations of only a few hours, we thought something must have been up. The only thing was the phenomena were reported progressively from Pluto to Neptune, clear across the solar system, in a definite progression, but at a velocity of crossing that didn't tie in with any conceivable force. They crossed faster than the velocity of light. That ship must have spent about half an hour off each planet before passing on to the next. And, accepting your faster-than-light explanation, we can understand it."

"Then I think you have proof."

"If we have, what would you do about it?"

"Get to work on those 'misreadings' of the instruments for one thing, and for a second, and more important, line every IP ship with paraffine blocks six inches thick."

"Paraffine—why?"

"The easiest form of hydrogen to get. You can't use solid hydrogen, because that melts too easily. Water can be turned into steam too easily, and requires more work. Paraffine is a solid that's largely hydrogen. That's

what they've always used on neutrons since they discovered them. Confine your paraffine between tungsten walls, and you'll stop the secondary protons as well as the neutrons."

"Hmmm—I suppose so. How about seeing those physicists?"

"I'd like to see them to-day, sir. The sooner you get started on this work, the better it will be for the IP."

"Having seen me, will you join up in the IP again?" asked McLaurin.

"No, sir, I don't think I will. I have another field you know, in which I may be more useful. Cole here's a better technician than fighter—and a darned good fighter too—and I think that an inexperienced space-captain is a lot less useful than a second rate physicist at work in a laboratory. If we hope to get anywhere, or for that matter, I suspect, stay anywhere, we'll have to do a lot of research pretty promptly."

"What's your explanation of that ship?"

"One of two things: an inventor of some other system trying out his latest toy, or an expedition sent out by a planetary government for exploration. I favor the latter for two reasons: that ship was *big*. No inventor would build a thing that size, requiring a crew of several hundred men to try out his invention. A government would build just about that if they wanted to send out an expedition. If it were an inventor, he'd be interested in meeting other people, to see what they had in the way of science, and probably he'd want to do it in a peaceable way. That fellow wasn't interested in peace, by any means. So I think it's a government ship, and an unfriendly government. They sent that ship out either for scientific research, for trade research and exploration, or for acquisitive exploration. If they were out

for scientific research, they'd proceed as would the inventor, to establish friendly communication. If they were out for trade, the same would apply. If they were out for acquisitive exploration, they'd investigate the planets, the sun, the people, only to the extent of learning how best to overcome them. They'd want to get a sample of our people, and a sample of our weapons. They'd want samples of our machinery, our literature and our technology. That's exactly what that ship got.

"Somebody, somewhere out there in space, either doesn't like their home, or wants more home. They've been out looking for one. I'll bet they sent out hundreds of expeditions to thousands of near by stars, gradually going further and further, seeking a planetary system. This is probably the one and only one they found. It's a good one too. It has planets at all temperatures, of all sizes. It is a fairly compact one, it has a stable sun that will last far longer than any race can hope to."

"Hmm—how can there be good and bad planetary systems?" asked McLaurin. "I'd never thought of that."

Kendall laughed. "Mighty easy. How'd you like to live on a planet of a Cepheid Variable? Pleasant situation, with the radiation flaring up and down. How'd you like to live on a planet of Antares. That blasted sun is so big, to have a comfortable planet you'd have to be at least ten billion miles out. Then if you had an inter-planetary commerce, you'd have to struggle with orbits tens of billions of miles across instead of mere millions. Further, you'd have a sun so blasted big, it would take an impossible amount of energy to lift the ship up from one planet to another. If your trip was, say, twenty billions of miles to the next planet, you'd be

fighting a gravity as bad as the solar gravity at earth here all the way—no decline with a little distance like that."

"H-m-m-m—quite true. Then I should say that Mira would take the prize. It's a red giant, and it's an irregular variable. The sunlight there would be as unstable as the weather in New England. It's almost as big as Antares, and it won't hold still. Now that *would* make a bad planetary system."

"It would!" laughed Kendall. But as we know—he laughed too soon, and he shouldn't have used the conditional. He should have said, "It does!"

CHAPTER III

GRESTH GKAE, Commander of Expeditionary Force 93, of the Planet Sthor, was returning homeward with joyful mind. In the lock of his great ship, lay the T-247. In her cargo holds lay various items of machinery, mining supplies, foods, and records. And in her log books lay the records of many readings on the nine larger planets of a highly satisfactory planetary system.

Gresth Gkae had spent no less than three ultra-wearing years going from one sun to another in a definitely mapped out section of space. He had investigated only eleven stars in that time, eleven stars, progressively further from the titanic red-flaming sun he knew as "the" sun. He knew it as "the" sun, and had several other appellations for it. Mira was so-named by earth-men because it was indeed a "wonder" star, in Latin, mirare means "to wonder." Irregularly, and for no apparent reason it would change its rate of radiation. So far as those inhabitants of Sthor and her sister world Asthor knew, there was

no reason. It just did it. Perhaps with malicious intent to be annoying. If so, it was exceptionally successful. Sthor and Asthor experienced, periodically, a young ice age. When Mira decided to take a rest, Sthor and Asthor froze up, from the poles most of the way to the equators. Then Mira would stretch herself a little, move about restlessly and Sthor and Asthor would become uninhabitably hot, anywhere within twenty degrees of the equator.

Those Sthorian people had evolved in a way that made the conditions endurable for savage or uncivilized people, but when a scientific civilization with a well-ordered mode of existence tried to establish itself, Mira was all sorts of a nuisance.

Gresth Gkæ was a peculiar individual to human ways of thinking. He stood some seven feet tall, on his strange, double-kneed legs and his four toed feet. His body was covered with little, short feather-like things that moved now with a volition of their own. They were moving very slowly and regularly. The space-ship was heated to a comfortable temperature, and the little fans were helping to cool Gresth Gkæ. Had it been cold, every little feather would have lain down close against its neighbors, forming an admirable, wind-proof and cold-proof blanket.

Nature, on Sthor, had original ideas of arrangement too. Sthorians possessed two eyes—one directly above the other, in the center of their faces. The face was so long, and narrow, it resembled a blunt hatchet, with the two eyes on the edge. To counter-balance this vertical arrangement of the eyes, the nostrils had been separated some four inches, with one on each of the sloping cheeks. His ears were little pink-flesh cups on

short, muscular stems. His mouth was narrow, and small, but armed with quite solid teeth adapted to his diet, a diet consisting of almost anything any creature had ever considered edible. Like most successful forms of intelligent life, Gresth Gkæ was omnivorous. An intelligent form of life is necessarily adaptable, and adaptation meant being able to eat what was at hand.

One of his eyes, the upper one, was fully twice the size of the lower one. This was his telescopic eye. The lower, or microscopic eye was adapted to work for which a human being would have required a low power microscope, the upper eye possessed a more normal power of vision, *plus* considerable telescopic powers.

Gresth Gkæ was using it now to look ahead in the blank of space to where gigantic Mira appeared. On his screens now, Mira appeared deep violet, for he was approaching at a speed greater than that of light, and even this projected light of Mira was badly distorted.

"The distance is half a light year now, sir," reported the navigation officer.

"Reduce the speed, then, to normal velocity for these ranges. What reserve of fuel have we?"

"Less than one thousand pounds. We will barely be able to stop. We were too free in the use of our weapons, I fear," replied the Chief Technician.

"Well, what would you? We needed those things in our reports. Besides, we could extract fuel from that ore we took on at Planet Nine of Phahlo. It is merely that I wish speed in the return."

"As we all do. How soon do you believe the Council will proceed against the new system?"

"It will be fully a year, I fear. They must gather the expeditions together, and re-equip the ships. It will be a long time before all will have come in."

"Could they not send fast ships after them to recall them?"

"Could they have traced us as we wove our way from Thart to Karst to Raloork to Phahlo? It would be impossible."

STEADILY the great ship had been boring on her way. Mira had been a disc for nearly two days, gigantic, two-hundred-and-fifty-million-mile Mira took a great deal of dwarfing by distance to lose her disc. Even at the Twin Planets, eight thousand two hundred and fifty millions of miles out, Mira covered half the sky, it seemed, red and angry. Sometimes, though, to the disgust of the Sthorians it was just red-faced and lazy. Then Sthor froze.

"Grih is in a descendent stage," said the navigation officer presently. "Sthor will be cold when we arrive."

"It will warm quickly enough with our news!" Gresth laughed. "A system—a delightful system—discovered. A system of many close-grouped planets. Why think—from one side of that system to the other is less of a distance than from Ansthat, our first planet's orbit, to Insthor's orbit! That sun, as we know, is steady and warm. All will be well, when we have eliminated that rather peculiar race. Odd, that they should, in some ways, be so nearly like us! Nearly Sthorian in build. I would not have expected it. Though they did have some amazing peculiarities! Imagine—two eyes just alike, and in a horizontal row. And that flat face. They looked as though they had suffered some accident that smashed the front of the face in. And

also the peculiar beak-like projection. Why should a race ever develop so amazing a projection in so peculiar and exposed a position? It sticks out inviting attack and injury. Right in the middle of the face. And to make it worse, there is the air-channel, and the only air channel. Why, one minor injury to the throat would be certain to damage that passage beyond repair, and bring death. Yet such relatively unimportant things as ears, and eyes are doubled. Surely you would expect that so important a member as the air-passage would be doubled for safety.

"Those strange, awkward arms and legs were what puzzled me. I have been attempting to manipulate myself as they must be forced to, and I cannot see how delicate or accurate manual manipulation would be possible with those rigid, inflexible arms. In some ways I feel they must have had clever minds to overcome so great a handicap to constructive work. But I suppose single joints in the arms become as natural to them as our own more mobile two.

"I wonder if life in any intelligent form wouldn't develop somewhat similar formations, though. Think, in all parts of Sthor, before men became civilized and developed communication, even so much as twenty thousand years ago, our records show that seats and chairs were much as they are today, and much as they are, in all places among all groups. Then too, the eye has developed in many different species, and always reached much the same structure. When a thing is intended and developed to serve a given purpose, no matter who develops it, or where or how, is it not apt to have similar shapes and parts? A chair must have legs, and a seat and arm-rests and a back. You may

vary their nature and their shape, but not widely, and they must be there. An eye must, anywhere, have a sensitive retina, an adjustable lens, and an adjustable device for controlling the entrance of light. Similarly there are certain functions that the body of an intelligent creature must serve which naturally tend to make intelligent creatures similar. He must have a tool—the hand—”

“Yes, yes—I see your point. It must be so, for surely these creatures out there are strange enough in other ways.

“But tell me, have you calculated when we shall land?”

“In twelve hours, thirty-three minutes, Sir.”

Eleven hours later, the expedition ship had slowed to a normal space-speed. On her left hung the giant globe of Asthor, rotating slowly, moving slowly in her orbit. Directly ahead, Sthor loomed even greater. Tiny Teelan, the thousand-mile diameter moon of the Insthor system shone dull red in the reflected light of gigantic Mira. Mira herself was gigantic, red and menacing across eight and a quarter billions of miles of space.

One hundred thousand miles apart, the twin worlds Sthor and Asthor rotated about their common center of gravity, eternally facing each other. Ten million miles from their common center of gravity, Teelan rotated in a vast orbit.

Sthor and Asthor were capped at each pole now by gigantic white ice-caps. Mira was sulking, and as a consequence the planets were freezing.

The expedition ship sank slowly toward Sthor. A swarm of smaller craft had flown up at its approach to meet it. A gayly-colored, small ship

marked the official greeting-ship. Gresth had withheld his news purposely. Now suddenly he began broadcasting it from the powerful transmitter on his ship. As the words came through on a thousand sets, all the little ships began to whirl, dance and break out into glowing, sparkling lights. On Sthor and Asthor even commotions began to be visible. A new planetary system had been found—They could move! Their overflowing populations could be spread out!

The whole Insthor system went mad with delight as the great Expeditionary Ship settled downward.

CHAPTER IV

THERE was a glint of humor in Buck Kendall's eyes as he passed the sheet over to McLaurin. Commander McLaurin looked down the columns with twinkling eyes.

“‘Petition to establish the Lunar Mining Bank,’” he read. “What a bank! Officers: President, General James Logan, late of the IP; Vice-president, Colonel Warren Gerardhi, also late of the IP; Staff, consists of 90% ex-IP men, and a few scattered accountants. Designed by the well-known designer of IP stations, Colonel Richard Murray.” Commander McLaurin looked up at Kendall with a broad grin. “And you actually got Interplanetary Life to give you a mortgage on the structure?”

“Why not? It'll cost fifty-eight millions, with its twelve-foot tungsten-beryllium walls and the heavy defense weapons against those terrible pirates. You know we must defend our property.”

“With the thing you're setting up out there on Luna, you could more readily wipe out the IP than any-

thing else I know of. Any new defense ideas?"

"Plenty. Did you get any further appropriations from the IP Appropriations Board?"

McLaurin looked sour. "No. The dear taxpayers might object, and those thick-headed, clogged rockets on the Board can't see your data on the Stranger. They gave me just ten millions, and that only because you demonstrated you could shoot every living thing out of the latest IP cruiser with that neutron gun of yours. By the way, they may kick when I don't install more than a few of those."

"Let 'em. You can stall for a few months. You'll need that money more for other purposes. You've installed that paraffine lining?"

"Yes—I got a report on that of 'finished' last week. How have you made out?"

Buck Kendall's face fell. "Not so hot. Devin's been the biggest help—he did most of the work on that neutron gun really—"

"After," McLaurin interrupted, "you told him how."

"—but we're pretty well stuck now, it seems. You'll be off duty tomorrow evening, can't you drop around to the lab.? We're going to try out a new system for releasing atomic energy."

"Isn't that a pretty faint hope? We've been trying to get it for three centuries now, and haven't yet. What chance at it within a year or so?—which is the time you allow yourself before the Stranger returns."

"It is, I'll admit that. But there's another factor, not to be forgotten. The data we got from correlating those 'misreadings' from the various IP posts mean a lot. We are working on an entirely different trail now. You come on out, and you can see

our new apparatus. They are working on tremendous voltages, and hoping to smash the thing by a brutal bombardment of terrific voltage. We're trying, thanks to the results of those instruments, to get results with small, terrifically intense fields."

"How do you know that's their general system?"

"They left traces on the records of the post instruments. These records show such intensities as we never got. They have atomic energy, necessarily, and they might have had material energy, actual destruction of matter, but apparently, from the field readings it's the former. To be able to make those tremendous hops, light-years in length, they needed a real store of energy. They have accumulators, of course, but I don't think they could store enough power by the system they use to do it."

"Well, how's your trick 'bank' out on Luna, despite its twelve-foot walls, going to stand an atomic explosion?"

"More protective devices to come is our only hope. I'm working on three trails: atomic energy, some type of magnetic shield that will stop any moving material particle, and their faster-than-light thing. Also, that fortress—I mean, of course bank—is going to have a lot of lead-lined rooms."

"I wish I could use the remaining money the Board gave me to lead-line a lot of those IP ships," said McLaurin wistfully. "Can't you make a gamma-ray bomb of some sort?"

"Not without their atomic energy release. With it of course, it's easy to flood a region with rays. It'll be a million times worse than radium 'C,' which is bad enough."

"Well, I'll send through this petition for armaments. They'll pass it all right, I think. They may get some

kicks from old Jacob Ezra Stubbs. Jacob Ezra doesn't believe in anything war-like. I wish they'd find some way to keep him off of the Arms Petition Board. He might just as well stay home and let 'em vote his ticket uniformly 'nay.'" Buck Kendall left with a laugh.

BUCK KENDALL had his troubles though. When he had reached earth again, he found that his properties totaled one hundred and three million dollars, roughly. One doesn't sell properties of that magnitude, one borrows against them. But to all intents and purposes, Buck Kendall owned two half-completed ship's hulls in the Baldwin Spaceship Yards, a great deal of massive metal work on its way to Luna, and contracts for some very extensive work on a "bank." Beyond that, about eleven millions was left.

A large portion of the money had been invested in a laboratory, the like of which the world had never seen. It was devoted exclusively to physics, and principally the physics of destruction. Dr. Paul Devin was the Director, Cole was in charge of the technical work, and Buck Kendall was free to do all the work he thought needed doing.

Returned to his laboratory, he looked sourly at the bench on which seven mechanics were working. The ninth successive experiment on the release of atomic energy had failed. The tenth was in process of construction. A heavy pure tungsten dome, three feet in diameter, three inches thick, was being lowered over a clear insulum dome, a foot smaller. Inside, the real apparatus was arranged around the little pool of mercury. From it, two massive tungsten-copper alloy conductors led through

the insulum housing, and outside. These, so Kendall had hoped, would surge with the power of broken atoms, but he was beginning to believe rather bitterly, they would never do so.

Buck went on to his offices, and the main calculator room. There were ten calculator tables here, two of them in operation now.

"Hello, Devin. Getting on?"

"No," said Devin bitterly, "I'm getting off. Look at these results." He brought over a sheaf of graphs, with explanatory tables attached. Rapidly Buck ran through them with him. Most of them were graphs of functions of light, considered as a wave in these experiments.

"H-m-m-m—not very encouraging. Looks like you've got the field—but it just snaps shut on itself and won't work. The lack of volume makes it break down, if you establish it, and makes it impossible to establish in the first place without the energy of matter. Not so hot. That's certainly cock-eyed somewhere."

"I'm not. The math may be."

"Well," grinned Kendall, "it amounts to the same thing. The point is, light doesn't. Let's run over that theory again. Light is not only magnetic, but electric. Somehow it transforms electric fields cyclically into magnetic fields and back again. Now what we want to do is to transform an electric into a magnetic field and have it stay there. That's the first step. The second thing, is to have the lines of magnetic force you develop, lie down like a sheath around the ship, instead of standing out like the hairs on an angry cat, the way they want to. That means turning them ninety degrees, and turning an electric into a magnetic field means turning the space-strain ninety degrees.

Light evidently forms a magnetic field whose lines of force reach along its direction of motion, so that's your starting point."

"Yes, and *that*," growled Devin, "seems to be the finishing point. Quite definitely and clearly, the graph looped down to zero. In other words, the field closed in on itself, and destroyed itself."

"Light doesn't vanish."

"I'll make you all the lights you want."

"I simply mean there must be something that will stop it."

"Certainly. Transform it back to electric field before it gets a chance to close in, then repeat the process—the way light does."

"That wouldn't make such a good magnetic shield. Every time that field started pulsing out through the walls of the ship it would generate heat. We want a permanent field that will stay on the job out there. I wonder if you couldn't make a conductor device that would open that field out—some special type of oscillating field that would keep it open."

"H-m-m-m—that's an angle I might try. Any suggestions?"

Kendall had suggestions, and rapidly he outlined a development that appeared from some of the earlier mathematics on light, and might be what they wanted.

KENDALL, however, had problems of his own to work on. The question of atomic energy he was leaving alone, till the present experiment either succeeded, or, as he rather suspected, failed as had its predecessors. His present problem was to develop more fully some interesting lines of research he had run across in investigating mathematically the trick of turning electric to

magnetic fields and then turning them back again. It might be that along this line he would find the answer to the speed greater than that of light. At any rate, he was interested.

He worked the rest of that day, and most of the next on that line—till he ran it into the ground with a pair of equations that ended with the expression: $dx \cdot dv = h / (4\pi m)$. Then Kendall looked at them for a long moment, then he sighed gently and threw them into a file cabinet. Heisenberg's Uncertainty. He'd reduced the thing to a form that simply told him it was beyond the limits of certainty and he ran it into the normal, natural uncertainty inevitable in Nature.

Anyway he had real work to do now. The machine was about ready for his attention. The mechanics had finished putting it in shape for demonstration and trial. He himself would have to test it over the rest of the afternoon and arrange for power and so forth.

By evening, when Commander McLaurin called around with some of the other investors in Kendall's "bank" on Luna the thing was already started, warming up. The fields were being fed and the various scientists of the group were watching with interest. Power was flowing in already at a rate of nearly one hundred thousand horsepower per minute, thanks to a special line given them by New York Power (a Kendall property). At ten o'clock they were beginning to expect the reaction to start. By this time the fields weren't gaining in intensity very rapidly, a maximum intensity had been reached that should, they felt, break the atoms soon.

At eleven-thirty, through the little view window, Buck Kendall saw something that made him cry out in

amazement. The mercury metal in the receiver, behind its layers of screening was beginning to glow, with a dull reddish light, and little solidifications were appearing in it! Eagerly the men looked, as the solidifications spread slowly, like crystals growing in an evaporating solution.

Twelve o'clock came and went, and one o'clock and two o'clock. Still the slow crystallization went on. Buck Kendall was casting furtive glances at the killowatt-hour meter. It stood at a figure that represented twenty-seven thousand dollars' worth of power. Long since the power rate had been increased to the maximum available, as the power plant's normal load reduced as the morning hours came. Surely, this time something would start, but Buck had two worries. If all the enormous amount of energy they had poured in there decided to release itself at once—

And at any rate, Buck saw they'd never dare to let a generator stop, once it was started!

The men were a tense group around the machine at three-fifteen A. M. There remained only a tiny, dancing globule of silvery mercury skittering around on the sharp, needle-like crystals of the dull red metal that had resulted. Slowly that skittering drop was shrinking—

Three twenty-two and a half A. M. saw the last fraction of it vanish. Tensely the men stared into the machine—backing off slowly—watching the meters on the board—. At nearly eighty thousand volts the power had been fed into it—.

The power continued to flow, and a growing halo of intense violet light appeared suddenly on those red, needle-like crystals, a swiftly expanding halo—

Without a sound, without the slightest disturbance, the halo vanished, and softly, gently, the needle-like crystals relapsed, melted away, and a dull pool of metallic mercury rested in the receiver.

At eighty thousand volts, power was flowing in—

And it didn't even sparkle.

CHAPTER V

THE apparatus of the magnetic shield had been completed two days later, and set up in Buck's own laboratory. On the bench was the powerful, but small, little projector of the straight magnetic field, simply a specially designed accumulator, a super-condenser, and the peculiar apparatus Devin had designed to distort the electric field through ninety degrees to a magnetic field. Behind this was a curious, parabaloid projector made up of hundreds of tiny, carefully orientated coils. This was Buck's own contribution. They were ready for the tests.

"I would invite McLaurin in to see this," said Kendall looking at them, and then across the room bitterly toward the alleged atomic power apparatus on the opposite bench. "I think it will work. But after *that*—" He stared, glaring, at the heavy tungsten dome with its heavy tungsten contacts, across which the flame of released atomic energy was supposed to have leapt. "That was probably the flattest flop any experiment ever flopped."

"Well—it didn't blow up. That's one comfort," suggested Devin.

"I wish it had. Then at least it would have shown some response. The only response shown, actually, was shown on the power meter. It

damn near wore out the bearings turning so fast."

"Personally, I prefer the lack of action," laughed Devin. "Have you got that circuit hooked up?"

"Right," sighed Kendall turning back to the work in hand. "Is Douglass in on this?"

"Yes—in the next room. He'll let us know when he's ready. He's setting up those instruments."

Douglass, a young junior physicist, late of the IP Physics Department, stuck his head in the door and announced his instruments were all set up.

"Keep an eye on them. They'll move somehow, at any rate. This thing couldn't go as flat as that atom-buster of mine."

Carefully Kendall made a few last-minute adjustments on the limiting relays, and took up his position at the power board. Devin took his place near the apparatus, with another series of instruments, similar to those Douglass was now watching in the next room, some thirty feet away, through the two-inch metal wall. "Ready," called Kendall.

The switch shot home. Instantly Kendall, Devin, and all the men in the building jumped some six feet from their former positions. A monstrous roar of sound crashed out in that laboratory that thundered from one wall to the other, and bellowed in a Titan's fury. It thundered and growled, it bellowed and howled, the walls shook with the march and counter-march of crashing waves of sound.

And a ten-foot wavering flame of blue-white, bellying electric fire shuddered up to the ceiling from the contact points of the alleged atomic generator. The heat, pouring out from the flashing, roaring arc sent prickles

of aching burns over Kendall's skin. For ten seconds he stood in utter, paralyzed surprise as his flop of flops bellowed its anger at his disdain. Then he leapt to the power board and shut off the roaring thing, by cutting the switch that had started it.

"Spirits of Space! Did *that* come to life!"

"Atomic Energy!" Devin cried.

"Atomic energy, hell. That's my thirty thousand dollars' worth of power breaking loose again," chortled Kendall. "We missed the atomic energy, but, sweet boy, what an accumulator we stubbed our toes on! I wondered where in blazes all that power went to. That's the answer. I'll bet I can tell you right now what happened. We built that mercury up to a new level, and that transitional stage was the red, crystalline metal. When it reached the higher stage, it was temporarily stable—but that projector over there that we designed for the purpose of holding open electric and magnetic fields just opened the door and let all that power right out again."

"But why isn't it atomic energy? How do you know that no more than your power that you put in is coming out?" demanded Devin.

"The arc, man, the arc. That was a high-current, and low-voltage arc. Couldn't you tell by the sound that no great voltage—as atomic voltages go—was smashing across there? If we were getting atomic voltage—and power—there'd have been a different tone to it, high and shriller.

"Now, did you take any readings?"

"What do you think, man? I'm human. Do you think I got any readings with that thing bellowing and shrieking in my ears, and burning my skin with ultra-violet? It itches now."

Kendall laughed. "You know what

to do for an itch. Now, I'm going to make a bet. We had those points separated for a half-million volts discharge, but there was a dust-cover thrown over them just now. That, you notice, is missing. I'll bet that served as a starter lead for the main arc. Now I'm going to start that projector thing again, and move the points there through about six inches, and that thing probably won't start itself."

MOST of the laboratory staff had collected at the doorway, looking in at the white-hot tungsten discharge points, and the now silent "atomic engine." Kendall turned to them and said: "The flop picked itself up. You go on back, we seem to be all in one piece yet. Douglass, you didn't get any readings did you?"

Sheepishly, Douglass grinned at him. "Eh—er—no—but I tore my pants. The magnetic field grabbed me and I jumped. They had some steel buttons, and a lot of steel keys—they're kinda' hard to keep on now."

The laboratory staff broke into a roar of laughter, as Douglass, holding up his trousers with both hands was beheld.

"I guess the field worked," he said.

"I guess maybe it did," adjudged Kendall solemnly. "We have some rope here if you need it—"

Douglass returned to his post.

Swiftly, Kendall altered the atomic distortion storage apparatus, and returned to the power-board. "Ready?"

"Check."

Kendall shoved home the switch. The storage device was silent. Only a slight feeling of strain made itself felt, and the sudden noisy hum of a small transformer nearby. "She works, Buck!" Devin called. "The readings check almost exactly."

"All good then. Now I want to get to that atomic thing. We can let that slide for a little bit—I'll answer it."

The telephone had rung noisily. "Kendall Labs—Foster speaking."

"This is Superintendent Foster, of the New York Power, Mr. Kendall. We have some trouble just now that we think your operations may be responsible for. The sub-station at North Beaumont blew all the fuses, and threw the breakers at the main station. The men out there said the transformers began howling—"

"Right you are—I'm afraid I did do that. I had no idea that it would reach so far. How far is that from my place here?"

"It's about a thousand yards, according to the survey maps."

"Thanks—and I'll be careful about it. Any damage, I am responsible for? All okay?"

"Yes, Sir, Mr. Kendall." Kendall hung up. "We stirred up a lot more dust than we expected, Devin. Now let's start seeing if we can keep track of it, Douglass, how did your readings show?"

"I took them at the ten stations, and here they are. The stations are two feet apart."

"H-m-m—.5—.55—.6—.7—.20—.198—.5950—.6010—.6012—.5920. Very, very nice—only the darned thing's got an arm as long as the law. Your readings were about .2, Devin?"

"That's right."

"Then these little readings are just leakage. What's our normal intensity here?"

"About .19. Just a very small fraction less than the readings."

"Perfect—we have what amounts to a hollow shell of magnetic force—we can move inside, and you can move outside—far enough. But you can't get a conductor or a magnetic field

Am. S.

through it." He put the readings on the bench, and looked at the apparatus across the room. "Now I want to start right on that other. Douglass, you move that magnetostat apparatus out of the way, and leave just the 'can-opener' of ours—the projector. I'm pretty sure that's what does the deed. Devin, see if you can hunt up some electro-static voltmeters with a range in the neighborhood of—I think it'll be about eighty thousand."

RAPIDLY, Douglass was dismounting the apparatus, as Devin started for the stock room. Kendall started making some new connections, reconnecting the apparatus they had intended using on the "atomic engine," largely high-capacity resistances. He seemed to perform this work mechanically, his mind definitely on something else. Suddenly he stopped, and looked carefully into the receiver of the machine. The metal in it was silvery, liquid, and here and there a floating crystal of the dull red metal. Slowly a smile spread across his face. He turned to Douglass.

"Douglass—ah, you're through. Get on the trail of MacBride, and get him and his crew to work making half a dozen smaller things like this. Tell 'em they can leave off the tungsten shield. I want different metals in the receiver of each. Use—hmmm—sodium—copper—magnesium—aluminum, iron and chromium. Got it?"

"Yes, sir." He left, just as Devin returned with a large electro-static voltmeter.

"I'd like," said he, "to know how you know the voltage will range around eighty thousand."

"K-ring excitation potential for mercury. I'm willing to bet that thing simply shoved the whole electron sys-

tem of the mercury out a notch—that it simply *hasn't* any K-ring of electrons now. I'm trying some other metals. Douglass is going to have MacBride make up half a dozen more machines. Machines—they need a name. This—ah—this is an 'atostor.' MacBride's going to make up half a dozen of 'em, and try half a dozen metals. I'm almost certain that's not mercury in there now, at all. It's probably element 99 or something like it."

"It looks like mercury—"

"Certainly. So would 99. Following the periodic table, 99 would probably have an even lower melting point than mercury, be silvery, dense and heavy—and perhaps slightly radioactive. The series under the B family of Group II is Magnesium, Zinc, Cadmium, Mercury—and 99. The melting point is going down all the way, and they're all silvery metals. I'm going to try copper, and I fully expect it to turn silvery—in fact, to become silver."

"Then let's see." Swiftly they hooked up the apparatus, realigned the projector, and again Kendall took his place at the power-board. As he closed the switch, on no-load, the electrostatic voltmeter flopped over instantly, and steadied at just over 80,000 volts.

"I hate to say 'I told you so'," said Kendall. "But let's hook in a load. Try it on about 100 amps first."

Devin began cutting in load. The resistors began heating up swiftly as more and more current flowed through them. By not so much as by a vibration of the voltmeter needle, did the apparatus betray any strain as the load mounted swiftly. 100—200—500—1000 amperes. Still, that needle held steady. Finally, with a drain of ten thousand amperes, all

the equipment available could handle, the needle was steady as a rock, though the tremendous load of 800,000,000 watts was cut in and out. That, to atoms, atoms by the novillions, was no appreciable load at all. There was no internal resistance whatever. The perfect accumulator had certainly been discovered.

"I'll have to call McLaurin—" Kendall hurried away with a broad, broad smile.

CHAPTER VI

"HELLO, Tom?"

The telephone rattled in a peeved sort of way. "Yes, it is. What now? And when am I going to see you in a social sort of way again?"

"Not for a long, long time, I'm busy. I'm busy right now as a matter of fact. I'm calling up the Vice-president of Faragaut Interplanetary Lines, and I want to place an order."

"Why bother me? We have clerks, you know, for that sort of thing," suggested Faragaut in a pained voice.

"Tom, do you know how much I'm worth now?"

"Not much," replied Faragaut promptly. "What of it? I hear, as a matter of fact that you're worth even less in a business way. They're talking quite a lot down this way about an alleged bank you're setting up on Luna. I hear it's got more protective devices, and armour than any IP station in the System, that you even had it designed by an IP designer, and have a gang of Colonels and Generals in charge. I also hear that you've succeeded in getting rid of money at about one million dollars a day—just slightly shy of that."

"You overestimate me, my friend. Much of that is merely contracted for. Actually it'll take me nearly nine

months to get rid of it. And by that time I'll have more. Anyway, I think I have something like ten millions left. And remember that way back in the twentieth century some old fellow beat my record. Armour I think it was, lost a million dollars a day for a couple of months running.

"Anyway, what I called you up for was to say I'd like to order five hundred thousand tons of mercury, for delivery as soon as possible."

"What! Oh, say, I thought you were going in for business." Faragaut gave a slight laugh of relief.

"Tom, I am. I mean exactly what I say. I want five—hundred—thousand—tons of metallic mercury, and just as soon as you can get it."

"Man, there isn't that much in the system."

"I know it. Get all there is on the market for me, and contract to take all the 'Jupiter Heavy-Metals' can turn out. You send those orders through, and clean out the market completely. Somebody's about to pay for the work I've been doing, and boy, they're going to pay through the nose. After you've got that order launched, and don't make a christening party of the launching either, why just drop out here, and I'll show you why the value of mercury is going so high you won't be able to follow it in a space ship."

"The cost of that," said Faragaut, seriously now, "will be about—fifty-three millions at the market price. You'd have to put up twenty-six cash, and I don't believe you've got it."

Buck laughed. "Tom, loan me a dozen millions, will you? You send that order through, and then come see what I've got. I've got a break, too! Mercury's the best metal for this use—and it'll stop gamma rays too!"

"So it will—but for the love of the system, what of it?"

"Come and see—tonight. Will you send that order through?"

"I will, Buck. I hope you're right. Cash is tight, now and I'll probably have to put up nearer twenty millions, when all that buying goes through. How long will it be tied up in that deal, do you think?"

"Not over three weeks. And I'll guarantee you three hundred percent—if you'll stay in with me after you start. Otherwise—I don't think making this money would be fair just now."

"I'll be out to see you in about two hours, Buck. Where are you? At the estate?" asked Faragaut seriously.

"In my lab out there. Thanks, Tom."

McLAURIN was there when Tom Faragaut arrived. And General Logan, and Colonel Gerardi. There was a restrained air of gratefulness about all of them, that Tom Faragaut couldn't quite understand. He had been looking up Buck Kendall's famous bank, and more and more he had begun to wonder just what was up. The list of stockholders had read like a list of IP heroes and executives. The staff had been a list of IP men with a slender sprinkling of accountants. And the sixty-million dollar structure was to be a bank without advertising of any sort! Usually such a venture is planned and published months in advance. This had sprung up suddenly, with a strange quietness.

Almost silently, Buck Kendall led the way to the laboratory. A small metal tank was supported in a peculiar piece of apparatus, and from it lead a small platinum pipe to a domed apparatus made largely of insulum. A little pool of mercury, with

small red crystals floating in it rested in a shallow hollow surrounded by heavy conductors.

"That's it, Tom. I wanted to show you first what we have, and why I wanted all that mercury. Within three weeks, every man woman and child in the system will be clamoring for mercury metal. That's the perfect accumulator." Quickly he demonstrated the machine, charging it, and then discharging it. It was better than 99.95% efficient on the charge, and was 100% efficient on the discharge.

"Physically, any metal will do. Technically, mercury is best for a number of reasons. It's a liquid. I can, and do it in this, charge a certain quantity, and then move it up to the storage tank. Charge another pool, and move it up. In discharge, I can let a stream flow in continuously if I required a steady, terrific drain of power without interruption. If I wanted it for more normal service, I'd discharge a pool, drain it, refill the receiver, and discharge a second pool. Thus, mercury is the metal to use."

"Do you see why I wanted all that metal?"

"I do, Buck—Lord, I do," gasped Faragaut. "That is the perfect power supply."

"No, confound it, it isn't. It's a secondary source. It isn't primary. We're just as limited in the supply of power as ever—only we have increased our distribution of power. Lord knows, we're going to need a power supply badly enough before long—" Buck relapsed into moody silence.

"What," asked Faragaut looking around him, "does that mean?"

It was McLaurin who told him of the stranger ship, and Kendall's interpretation of its meaning. Slowly

Faragaut grasped the meaning behind Buck's strange actions of the past months.

"The Lunar Bank," he said slowly, half to himself. "Staffed by trained IP men, experts in expert destruction. Buck, you said something about the profits of this venture. What did you mean?"

Buck smiled. "We're going to stick up IP to the extent necessary to pay for that fort—er—bank—on Luna. We'll also boost the price so that we'll make enough to pay for those ships I'm having made. The public will pay for that."

"I see. And we aren't to stick the price too high, and just make money?"

"That's the general idea."

"The IP Appropriations Board won't give you what you need, Commander, for real improvements on the IP ships?"

"They won't believe Kendall. Therefore they won't."

"What did you mean about gamma rays, Buck?"

"Mercury will stop them and the Commander here intends to have the refitted ships built so that the engine room and control room are one, and completely surrounded by the mercury tanks. The men will be protected against the gamma rays."

"Won't the rays affect the power stored in the mercury—perhaps release it?"

"We tried it out, of course, and while we can't get the intensities we expect, and can't really make any measurements of the gamma-ray energy impinging on the mercury—it seems to absorb, and store that energy!"

"What's next on the program, Buck?"

"Finish those ships I have building. And I want to do some more development work. The Stranger will return within six months now, I believe. It will take all that time, and more for real refitting of the IP ships."

"How about more forts—or banks, whichever you want to call them. Mars isn't protected."

"Mars is abandoned," replied General Logan seriously. "We haven't any too much to protect old earth, and she must come first. Mars will, of course be protected as best the IP ships can. But—we're expecting defeat. This isn't a case of glorious victory. It will be a case of hard won survival. We don't know anything about the enemy—except that they are capable of interstellar flights, and have atomic energy. They are evidently far ahead of us. Our battle is to survive till we learn how to conquer. For a time, at least, the Strangers will have possession of most of the planets of the system. We do not think they will be able to reach earth, because Commander McLaurin here will withdraw his ships to earth to protect the planet—and the great 'Lunar Bank' will display its true character."

CHAPTER VII

FARAGAUT looked unsympathetically at Buck Kendall, as he stood glaring perplexedly at the apparatus he had been working on.

"What's the matter, Buck, won't she perk?"

"No, damn it, and it should."

"That," pointed out Faragaut, "is just what you think. Nature thinks otherwise. We generally have to abide by her opinions. What is it—or what is it meant to be?"

"Perfect reflector."

"Make a nice mirror. What else, and how come?"

"A mirror is just what I want. I want something that will reflect all the radiation that falls on it. No metal will, even in its range of maximum reflectivity. Aluminum goes pretty high, silver, on some ranges, a bit higher. But none of them reaches 99%. I want a perfect reflector that I can put behind a source of wild, radiant energy so I can focus it, and put it where it will do the most good."

"Ninety-nine per cent. sounds pretty good. That's better efficiency than most anything else we have, isn't it?"

"No, it isn't. The accumulator is 100% efficient on the discharge, and a good transformer, even before that, ran as high as 99.8 sometimes. They had to. If you have a transformer handling 1,000,000 horsepower, and it's even 1% inefficient, you have a heat loss of nearly 10,000 horsepower to handle. I want to use this as a destructive weapon, and if I hand the other fellow energy in distressing amounts, it's even worse at my end, because no matter how perfect a beam I work out, there will still be some spread. I can make it mighty tight though, if I make my surface a perfect parabola. But if I send a million horse, I have to handle it, and a ship can't stand several hundred thousand horsepower roaming around loose as heat, let alone the weapon itself. The thing will be worse to me than to him.

"I figured there was something worth investigating in those fields we developed on our magnetic shield work. They had to do, you know, with light, and radiant energy. There must be some reason why a metal reflects. Further, though we can't get down

to the basic root of matter, the atom, yet, we can play around just about as we please with molecules and molecular forces. But it is molecular force that determines whether light and radiant energy of that caliber shall be reflected or transmitted. Take aluminum as an example. In the metallic molecule state, the metal will reflect pretty well. But volatilize it, and it becomes transparent. All gases are transparent, all metals reflective. Then the secret of perfect reflection lies at a molecular level in the organization of matter, and is within our reach. Well—this thing was supposed to make that piece of silver reflective. I missed it that time." He sighed. "I suppose I'll have to try again."

"I should think you'd use tungsten for that. If you do have a slight leak, that would handle the heat."

"No, it would hold it. Silver is a better conductor of heat. But the darned thing won't work."

"Your other scheme has," laughed Faragaut. "I came out principally for some signatures. IP wants one hundred thousand tons of mercury. I've sold most of mine already, in the open market. You want to sell?"

"Certainly. And I told you my price."

"I know," sighed Faragaut. "It seems a shame though. Those IP board men would pay higher. And they're so damn tight it seems a crime not to make 'em pay up when they have to."

"The IP will need the money worse elsewhere. Where do I—oh, here?"

"Right. I'll be out again this evening. The regular group will be here?"

Kendall nodded as he signed in triplicate.

THAT evening, Buck had found the trouble in his apparatus, for as he well knew, the theory was right, only the practical apparatus needed changing. Before the group composed of Faragaut, McLaurin and the members of Kendall's "bank," he demonstrated it.

It was merely a small, model apparatus, with a mirror of space-strained silver that was an absolutely perfect reflector. The mirror had been ground out of a block of silver one foot deep, by four inches square, carefully annealed, and the work had all been done in a cooling bath. The result was a mirror that was so nearly a perfect paraboloid that the beam held sharp and absolutely tight for the half-mile range they tested it on. At the projector it was three and one-half inches in diameter. At the target, it was three and fifty-two one hundredths inches in diameter.

"Well, you've got the mirror, what are you going to reflect with it now?" asked McLaurin. "The greatest problem is getting a radiant source isn't it? You can't get a temperature above about ten thousand degrees, and maintain it very long can you?"

"Why not?" smiled Kendall.

"It'll volatilize and leave the scene of action, won't it?"

"What if it's a gaseous source already?"

"What? Just a gas flame? That won't give you the point source you need. You're using just a spot-light here, with a Moregan Point-light. That won't give you energy, and if you use a gas-flame, the spread will be so great, that no matter how perfectly you figure your mirror it won't beam."

"The answer is easy. Not an ordinary gas flame—a very extra-special kind of gas-flame. Know anything

about Renwright's ionization-work?" "Renwright—he's an IP man isn't he?"

"Right. He's developed a system, which, thanks to the power we can get in that atoster, will sextuply ionize oxygen gas. Now: what does that mean?"

"Spirits of space! Concentrated essence of energy!"

"Right. And in preparation, Cole here had one made up for me. That—and something else. We'll just hook it up—"

With Devin's aid, Kendall attached the second apparatus, a larger device into which the silver block with its mirror surface fitted. With the uttermost care, the two physicists lined it up. Two projectors pointed toward each other at an angle, the base angles of a triangle, whose apex was the center of the mirror. On very low power, a soft, glowing violet light filtered out through the opening of the one, and a slight green light came from the other. But where the two streams met, an intense, violet glare built up. The center of action was not at the focus, and slowly this was lined up, till a sharp, violet beam of light reached out across the open yard to the target set up.

Buck Kendall cut off the power, and slowly got into position. "Now. Keep out from in front of that thing. Put on these glasses—and watch out." Heavy, thick-lensed orange-brown goggles were passed out, and Kendall took his place. Before him, a thick window of the same glass had been arranged, so that he might see uninterruptedly the controls at hand, and yet watch unblinded, the action of the beam.

Dully the mirror-force relay clicked. A hazy glow ran over the silver block, and died. Then—simul-

taneously the power was thrown from two small, compact atostors into the twin projectors. Instantly—a titanic eruption of light almost invisibly violet, spurted out in a solid, compact stream. With a roar and crash, it battered its way through the thick air, and crashed into the heavy target plate. A stream of flame and scintillating sparks erupted from the armor plate—and died as Kendall cut the beam. A white-hot area a foot across leaked down the face of the metal.

"That," said Faragaut gently, removing his goggles. "That's not a spotlight, and it's not exactly a gas-flame. But I still don't know what that blue-hot needle of destruction is. Just what do you call that tame stellar furnace of yours?"

"Not so far off, Tom," said Kendall happily. "except that even S Doradus is cold compared to that. That sends almost pure ultra-violet light—which, by the way, it is almost impossible to reflect successfully, and represents a temperature to be expressed not in thousands of degrees, nor yet in tens of thousands. I calculated the temperature would be about 750,000 degrees. What is happening is that a stream of low-voltage electrons—cathode rays—in great quantity are meeting great quantities of sextuply ionized oxygen. That means that a nucleus used to having two electrons in the K-ring, and six in the next, has had that outer six knocked off, and then has been hurled violently into free air.

"All by themselves, those sextuply ionized oxygen atoms would have a good bit to say, but they don't really begin to talk till they start roaring for those electrons I'm feeding them. At the meeting point, they grab up all they can get—probably about five—before the competition and the fierce

release of energy drives them out, part-satisfied. I lose a little energy there, but not a real fraction. It's the howl they put up for the first four that counts. The electron-feed is necessary, because otherwise they'd smash on and ruin that mirror. They work practically in a perfect vacuum. That beam smashes the air out of the way. Of course, in space it would work better."

"How could it?" asked Faragaut, faintly.

"Kendall," asked McLaurin, "can we install that in the IP ships?"

"You can start," shrugged Kendall. "There isn't a lot of apparatus. I'm going to install them in my ships, and in the—bank. I suspect—we haven't a lot of time left."

"How near ready are those ships?"

"About. That's all I can say. They've been torn up a bit for installation of the atostor apparatus. Now they'll have to be changed again."

"Anything more coming?"

Buck smiled slowly. He turned directly to McLaurin and replied: "Yes—the Strangers. As to developments—I can't tell naturally. But if they do, it will be something entirely unexpected now. You see, given one new discovery, a half-dozen will follow immediately from it. When we announced that atostor, look what happened. Renwright must have thought it was God's gift to suffering physicists. He stuck some oxygen in the thing, added some of his own stuff—and behold. The magnetic apparatus gave us directly the shield, and indirectly this mirror. Now, I seem to have reached the end for the time. I'm still trying to get that space-release for high speed—speed greater than light, that is. So far," he added bitterly, "all I've gotten as an answer is

a single expression that simply means practical zero—Heisenberg's Uncertainty Expression."

"I'm uncertain as to your meaning," smiled McLaurin. "but I take it that's nothing new."

"No. Nearly four centuries old—twentieth century physics. I'll have to try some other line of attack, I guess, but that did seem so darned right. It just sounded right. Something ought to happen—and it just keeps saying 'nothing more except the natural uncertainty of nature.'"

CHAPTER VII

CONCLUSION

GRESTH GKAE looked back at Sthor rapidly dropping behind, and across at her sister world, Asthor, circling a bare 100,000 miles away. Behind his great interstellar cruiser came a long line of similar ships. Each was loaded now not with instruments and pure scientists, but with weapons, fuel and warriors. Colonists too, came in the last ships. One hundred and fifty giant ships. All the wealth of Sthor and Asthor had been concentrated in producing those great machines. Every one represented nearly the equivalent of thirty million earth-dollars. Four and a half billions of dollars for mere materials.

Gresth Gkæ had the honor of lead position, for he had discovered the planets and their stable, though tiny, sun. Still, Gresth Gkæ knew his own giant Mira was a super-giant sun—and a curse and a menace to any rational society. Our yellow-white sun (to his eyes, an almost invisible color, similar to our blue) was small, but stable, and warm enough.

In half an hour, all the ships were in space, and at a given signal, at ten second intervals, they sprang into the superspeed, faster than light. For an instant, giant Mira ran and seemed

"Try it out, your math might be wrong somewhere."

Kendall laughed. "If it was—I'd hate to try it out. If it wasn't I'd have no reason to. And there's plenty of other work to do. For one thing, getting that apparatus in production. The IP board won't like me." Kendall smiled.

"They don't," replied McLaurin. "They're getting more and more worried—but they've got to keep the IP fleet in such condition that it can at least catch an up-to-date freighter."

distorted, as though seen through a port hole covered with running water, then steadied, curiously distorted. Faster than light, they raced across the galaxy.

Even in their super-fast ships, nearly three and a half weeks passed before the sun they sought, singled itself from the star-field as an extra bright point. Two days more, and the sun was within planetary distance. They came at an angle to the plane of the ecliptic, but they leveled down to it now, and slanted toward giant Jupiter and Jovian worlds. Ten worlds, in one sweep, it was—four habitable worlds. The nine satellites would be converted into forts at once, nine space-sweeping forts guarding the approaches to the planet. Gresth Gkæ had made a fairly good search of the worlds, and knew that earth was the main home of civilization in this system. Mars was second, and Venus third. But Jupiter offered the greatest possibilities for quick settlement, a base from which they could more easily operate, a base for fuels, for the heavy elements they would need—

Fifteen million miles from Jupiter they slowed below the speed of light—and the IP stations observed them. Instantly, according to instructions issued by Commander McLaurin, a fleet of ten of the tiniest, fastest

scouts darted out. As soon as possible, a group of three heavy cruisers, armed with all the inventions that had been discovered, the atostor power system, perfectly conducting power leads, the terrible UV ray, started out.

The scouts got there first. Cameras were grinding steadily, with long range telescopic lenses, delicate instruments probed and felt and caught their fingers in the fields of the giant fleet.

At ten second intervals, giant ships popped into being, and glided smoothly toward Jupiter.

Then the cruisers arrived. They halted at a respectful distance, and waited. The Miran ships plowed on undisturbed. Simultaneously, from the three leaders, terrific neutron rays shot out. The paraffine-block walls stopped those—and the cruisers started to explain their feelings on the subject. They were the IP-J-37, 39, and 42. The 37 turned up the full power of the UV ray. The terrific beam of ultra-violet energy struck the second Miran ship, and the spot it touched exploded into incandescence, burned white-hot—and puffed out abruptly as the air pressure within blew the molten metal away.

The Mirans were startled. This was not the type of thing Gresth Gkae had warned them of. Gresth Gkae himself frowned as the sudden roar of the machines of his ship rose in the metal walls. A stream of ten-inch atomic bombs shrieked out of their tubes, dully glowing green things floated out more slowly, and immediately waxed brilliant. Gamma ray bombs—but they could be guarded against—

The three Solarian cruisers were washed in such frightful flame as

they had never imagined. Streams of atomic bombs were exploding soundlessly, ineffectively in space, not thirty feet from them as they felt the sudden resistance of the magnetic shields. Hopefully, the 39 probed with her neutron gun. Nothing happened save that several gamma ray bombs went off explosively, and all the atomic bombs in its path exploded at once.

GRESTH GKAE knew what that meant. Neutron beam guns. Then this race was more intelligent than he had believed. They had not had them before: Had he perhaps given them too much warning and information?

There was a sudden, deeper note in the thrumming roar of the great ship. Eagerly Gresth Gkae watched—and sighed in relief. The nearer of the three enemy ships was crumbling to dust. Now the other two were beginning to become blurred of outline. They were fleeing—but oh, so slowly. Easily the greater ship chased them down, till only floating dust, and a few small pieces of—

Gresth Gkae shrieked in pain, and horror. The destroyed ships had fought in dying. All space seemed to blossom out with a terrible light, a light that wrapped around them, and burned into him, and through him. His eyes were dark and burning lumps in his head, his flesh seemed crawling, stinging—he was being flayed alive—in shrieking agony he crumpled to the floor.

Hospital attachés came to him, and injected drugs. Slowly torturing consciousness left him. The doctors began working over his horribly burned body, shuddering inwardly as the protective, feather-like covering of his skin loosened, and dropped from his

body. Tenderly they lowered him into a bath of chemicals—

"The terrible light which caused so much damage to our men," reported a physicist, "was analyzed, and found to have some extraordinary lines. It was largely mercury-vapor spectrum, but the spectrum of mercury-atoms in an impossibly strained condition. I would suggest that great care be used hereafter, and all men be equipped with protective masks when observations are needed. This sun is very rich in the infra-X-rays and ultra-visible light. The explosion of light, we witnessed, was dangerous in its consisting almost wholly of very short and hard infra-X-rays."

The physicist had a special term for what we know as ultra-violet light. To him, blue was ultra-violet, and exceedingly dangerous to red-sensitive eyes. To him, our ultra-violet was a long X-ray, and was designated by a special term. And to him—the explosion of the atostor reservoirs was a terrible and mistifying calamity.

To the men in the five tiny scout-ships, it was also a surprise, and a painful one. Even space-hardened humans were burned by the terrifically hard ultra-violet from the explosion. But they got some hint of what it had meant to the Mirans from the confusion that resulted in the fleet. Several of the nearer ships spun, twisted, and went erratically off their courses. All seemed uncontrolled momentarily.

The five scouts, following orders, darted instantly toward the Lunar Bank. Why, they did not know. But those were orders. They were to land there.

The reason was that, faster than any solarian ship, radio signals had reached McLaurin, and he, and most

of the staff of the IP service had been moved to the Lunar Bank. Buck Kendall had extended an invitation in this "unexpected emergency." It so happened that Buck Kendall's invitation got there before any description of the strangers, or their actions had arrived. The staff was somewhat puzzled as to how this happened—

And now for the satellites of great Jupiter.

One hundred and fifty giant interstellar cruisers advanced on Callisto. They didn't pause to investigate the mines and scattered farms of the satellite, but ten great ships settled, and a horde of warriors began pouring out.

One hundred and forty ships reached Ganymede. One hundred and thirty sailed on. One hundred and thirty ships reached Europa—and they sailed on hurriedly, one hundred and twenty-nine of them. Greth Gkac did not know it then, but the fleet had lost its first ship. The IP station on Europa had spoken back.

They sailed in, a mighty armada, and the first dropped through Europa's thin, frozen atmosphere. They spotted the dome of the station, and a neutron ray lashed out at it. On the other, undefended worlds, this had been effective. Here—it was answered by ten five-foot UV rays. Further, these men had learned something from the destruction of the cruisers, and ten torpedos had been unloaded, reloaded with atostor mercury, and sent out bravely.

Easily the Mirans wiped out the first torpedo—

Shrieking, the Miran pilots clawed their way from the controls as the fearful flood of ultra-violet light struck their unaccustomed skins. Others too felt that burning flood.

The second torpedo they caught

and deflected on a beam of alternating-current magnetism that repelled it. It did not come nearer than half a mile to the ship. The third they turned their deflecting beam on—and something went strangely wrong with the beam. It pulled that torpedo toward the ship with a sickening acceleration—and the torpedo exploded in that frightful violet flame.

FIVE-FOOT diameter UV beams are nothing to play with. The Mirans were dodging these now as they loosed atomic bombs, only to see them exploded harmlessly by neutron guns, or caught in the magnetic screen. Gamma ray bombs were as useless. Again the beam of disintegrating force was turned on—

The present opponent was not a ship. It was an IP defense station, equipped with everything Solarian science knew, and the dome was an eight foot wall of tungsto-beryllium. The eight feet of solid, ultra-resistant alloy drank up that crumbling beam, and liked it. The wall did not fail. The men inside the fort jerked and quivered as the strange beam, a small, small fraction of it, penetrated the eight feet of outer wall, the six feet or so of intervening walls, and the mercury atostor reserves.

"Concentrate all those UV beams on one spot, and see if you can blast a hole in him before he shakes it loose," ordered the ray technician. "He'll wiggle if you start off with the beam. Train your sights on the nose of that first ship—when you're ready, call out."

"Ready—ready—" Ten men replied. "Fire!" roared the technician. Ten titanic swords of pure ultra-violet energy, energy that practically no unconditioned metal will reflect to more than fifty per cent, emerged.

There was a single spot of intense incandescence for a single hundredth of a second—and then the energy was hurning its way through the inner, thinner skins with such rapidity that they sputtered and flickered like a broken televisior.

One hundred and twenty-nine ships retreated hastily for conference, leaving a gutted, wrecked hull, broken by its fall, on Europa. Triumphantly, the Europa IP station hurled out its radio message of the first encounter between a fort and the Miran forces.

Most important of all, it sent a great deal of badly wanted information regarding the Miran weapons. Particularly interesting was the fact that it had withstood the impact of that disintegrating ray.

CHAPTER VIII

GRIMLY Buck Kendall looked at the reports. McLaurin stood beside him, Devin sat across the table from him. "What do you make of it, Buck?" asked the Commander.

"That we have just one island of resistance left on the Jovian worlds. And that will, I fear vanish. They haven't finished with their arsenal by any means."

"But what was it, man, what was it that ruined those ships?"

"Vihration. Somehow—Lord only knows how it's done—they can project electric fields. These projected fields are oscillated, and they are tuned in with some parts of the ship. I suspect they are crystals of the metals. If they can start a vihration in the crystals of the metal—that's fatigue, metal fatigue enormously speeded. You know how a quartz crystal oscillator in a radio-control

apparatus will break, if you work it on a very heavy load at the peak? They simply smash the crystals of metal in the same way. Only they project their field."

"Then our toughest metals are useless? Can't something tough, rather than hard, like copper or even silver for instance, stand it?"

"Calcium metal's the toughest going—and even that would break under the beating those ships give it. The only way to withstand it is to have such a mass of metal that the oscillations are damped out. But—"

The set tuned in on the IP station on Europa was speaking again. "The ships are returning. There are one hundred and twenty-nine by accurate count. Jorgsen reports that telescopic observation of the dead on the fallen cruiser show them to be a *completely un-human race!* They are of mottled coloring, predominately greyish brown. The ships are returning. They have divided into ten groups, nine groups of two each, and a main body of the rest of the fleet. The group of eighteen is descending within range, and we are focusing our beams on them—"

Out by Europa, ten great UV beams were stabbing angrily toward ten great interstellar ships. The metal of the hulls glowed brilliant, and distorted slowly as the thick walls softened under the heat, and the air behind pressed against it. Grimly the ten ships came on. Torpedoes were being launched, and exploded, and now they had no effect, for the Mirans within were protected.

The eighteen grouped ships separated, and arranged themselves in a circle around the fort. Suddenly one staggered as a great puff of gas shot out through the thin atmosphere of Europa to flare brilliantly in the lash

of the stabbing UV beam. Instantly the ship righted itself, and laboured upward. Another dropped to take its place—

And the great walls of the IP fort suddenly groaned and started in their welded joints. The faint, whispering rustle of the crumbling beam was murmuring through the station. Engineers shouted suddenly as meters leapt the length of their scales, and the needles clicked softly on the stoppins. A thin rustle came from the atostors grouped in the great power room, "Spirits of Space—a revolving magnetic field!" roared the Chief Technician. "They're making this whole blasted station a squirrel-cage!"

The mighty walls of eight-foot metal shuddered and trembled. The UV beams lashed out from the fort in quivering arcs now, they did not hold their aim steady, and the magnetic shield that protected them from atomic bombs was working and straining wildly. Eighteen great ships quivered and tugged outside there now, straining with all their power to remain in the same spot, as they passed on from one to another the magnetic impulses that were now creating a titanic magnetic vortex about the fort.

"The atostors will be exhausted in another fifteen minutes," the Chief Technician roared into his transmitter. "Can the signals get through those fields, Comamnder?"

"No, Mac. They've been stopped, Sparks tells me. We're here—and let's hope we stay. What's happening?"

"They've got a revolving magnetic field out there that would spin a minor planet. The whole blasted fort is acting like the squirrel cage in an induction motor! They've made us the

armature in a five hundred million horsepower electric motor."

"They can't tear this place loose can they?"

"I don't know—it was never—" The Chief stopped. Outside a terrific roar and crash had built up. White darts of flame leapt a thousand feet into the air, hurling terrific masses of shattered rock and soil.

"I was going to say," the Chief went on, "this place wasn't designed for that sort of a strain. Our own magnetic field is supporting us now, preventing their magnetic field from getting its teeth on metal. When the strain comes—well, they're cutting loose our foundation with atomic bombs!"

FIVE UV beams were combined on one interstellar ship. Instantly the great machine retreated, and another dropped in to take its place while the magnetic field spun on, uninterrupted.

"Can they keep that up long?"

"God knows—but they have a hundred and more ships to send in when the power of one gives out, remember."

"What's our reserve now?"

The Chief paused a moment to look at the meters. "Half what it was ten minutes ago!"

Commander Wallace sent some other orders. Every torpedo tube of the station suddenly belched forth deadly, fifteen-foot torpedoes, most of them mud-torpedoes, torpedoes loaded with high explosive in the nose, a delayed fuse, and a load of soft clinging mud in the rear. The mud would flow down over the nose and offer a resistance foot-hold for the explosive which empty space would not. Four hundred and three torpedoes, equipped with anti-mag-

netic apparatus darted out. One hundred and four passed the struggling fields. One found lodgement on a Miran ship, and crushed in a metal wall, to be stopped by a bulkhead.

The Chief engineer watched his power declining. All ten UV beams were united in one now, driving a terrible sword of energy that made the attacked ship skip for safety instantly, yet the beams were all but useless. For the Miran reserves filled the gap, and the magnetic tornado continued.

For seventeen long minutes the station resisted the attack. Then the last of the strained mercury flowed into the receivers, and the vast power of the atostors was exhausted. Slowly the magnetic fields declined. The great walls of the station felt the clutching lines of force—they began to heat and to strain. A low, harsh grinding became audible over the roar of the atomic bombs. The whole structure trembled, and jumped slightly. The roar of bombs ceased suddenly, as the station jerked again, more violently. Then it turned a bit, rolled clumsily. Abruptly it began to spin violently, more and more rapidly. It started rolling clumsily across the plateau—

A rain of atomic bombs struck the unprotected metal, and the eighth breached the walls. The twentieth was the last. There was no longer an IP station on Europa.

"The difference," said Buck Kendall slowly, when the reports came in from scout-ships in space that had witnessed the last struggle, "between an atomic generator and an atomic powerstore, or accumulator, is clearly shown. We haven't an adequate source of power."

McLaurin sighed slowly, and rose to his feet. "What can we do?"

"Thank our lucky stars that Fara-gaut here, and I, bought up all the mercury in the system, and had it brought to earth. We at least have a supply of materials for the atostors.

"They don't seem to do much good."

"They're the best we've got. All the photocells on earth and Venus and Mercury are at present busy storing the sun's power in atostors. I have two thousand tons of charged mercury in our tanks here in the 'Lunar Bank'."

"Much good that will do—they can just pull and pull and pull till it's all gone. A star-fish isn't strong, but he can open the strongest oyster just because he can pull from now on. You may have a lot of power—but."

"But—we also have those new fifteen-foot UV beams. And one fifteen-foot UV beam is worth, theoretically, nine five-foot beams, and practically, a dozen. We have a dozen of them. Remember, this place was designed not only to protect itself, but earth too."

"They can still pull, can't they?"

"They'll stop pulling when they get their fingers burned. In the meantime, why not use some of those IP ships to bring in a few more cargoes of charged mercury?"

"They aren't good for much else, are they? I wonder if those fellows have anything more we don't know?"

"Oh, probably. I'm going to work on that crumbler thing. That's the first consideration now."

"Why?"

"So we can move a ship. As it is, even those two we built aren't any good."

"Would they be anyway?"

"Well—I think I might disturb those gentlemen slightly. Remember, they each have a nose-beam eighteen

feet across. Exceedingly unpleasant customers."

"Score: Strangers; magnetic field, atomic bombs, atomic power, crumbler ray. Home team; UV beams."

Kendall grinned. "I'd heard you were a pessimistic cuss when battle started—"

"Pessimistic, hell, I'm merely counting things up."

"McClellan had all the odds on Lee back in the Civil War of the States—but Lee sent him home faster than he came."

"But Lee lost in the end."

"Why bring that up? I've got work to do." Still smiling, Kendall went to the laboratory he had built up in the "Lunar Bank." Devin was already there, calculating. He looked unhappy.

"We can't do anything, as far as I can see. They're using an electric field all right, and projecting it. I can't see how we can do that."

"Neither can I," agreed Kendall, "so we can't use that weapon. I really didn't want to anyway. Like the neutron gun which I told Commander McLaurin would be useless as a weapon, they'd be prepared for it you can be sure. All I want to do is fight it, and make their projection useless."

"Well, we have to know how they project it before we can break up the projection, don't we?"

"Not at all. They're using an electric field of very high frequency, but variable frequency. As far as I can see, all we need is a similar variable electric field of a slightly different frequency to hetrodyne theirs into something quite harmless."

"Oh," said Devin. "We could, couldn't we? But how are you going to do that?"

"We'll have to learn, that's all."

BUCK KENDALL started trying to learn. In the meantime, the Mirans were taking over Jupiter. There were three IP stations on the planet itself, but they were vastly hindered by the thick, almost ultra violet proof atmosphere of Jupiter. Their rays were weak. And the magnetic fields of the Mirans were unaffected. Only their atomic bombs were hindered by the heavier gravity that pulled the rocks back in place faster than the bombs could throw them out. Still—a few hours of work, and the IP stations on Jupiter had rolled wildly across the flat plains of the planet like dented cans, to end in utter destruction.

The Mirans had paid no attention to the fleeing passenger and freighter ships that left the planet, loaded to the utmost with human cargo, and absolutely no freight. The IP fleet had to go to their rescue with oxygen tanks to take care of the extra humans, but nearly three-quarters of the population of Jupiter, a newly-established population, and hence a readily mobile one, was saved. The others, the Mirans did not bother with particularly except when they happened to be near where the Mirans wanted to work. Then they were instantly destroyed by atomic bombing, or gamma rays.

The Mirans settled almost at once, and began their work of finding on Jupiter the badly needed atomic fuels. Machines were set up, and work begun, Mirans laboring under the gravity of the heavy planet. Then, fifty ships swam up again, reloaded with fuel, and with crews consisting solely of uninjured warriors, and started for Mars.

Mars was half way between her near conjunction and her maximum elongation with respect to Jupiter at

that time. The Mirans knew their business though, for they started in on the IP station on Phobos. They were practiced by this time, and this IP station had only seven five-foot beams. In half an hour that station fell, and its sister station on Diemos followed. Three wounded ships returned to Jupiter, and ten new ships came out. The attack on Mars itself was started.

Mars was a different proposition. There were thirty-two IP stations here, one of them nearly as powerful as the Lunar Bank station. It was equipped with four of the huge fifteen-foot beams. And it had fifteen tons of mercury, more than seven-eighths charged. The Mars Center Station was located a short ten miles from the Mars Center City, and under the immediate orders of the IP heads, Mars Center City had been vacated.

For two days the Mirans hung off Mars, solidifying their positions on Phobos and Diemos. Then, with sixty-two ships, they attacked. They had made some very astute observations, and they started on the smaller stations just beyond the range of the Mars Center Station. Naturally, near so powerful a center, these stations had never been strong. They fell rapidly. But they had been counted on by Mars Center as auxiliary supports. McLaurin had sent very definite orders to Mars Center forbidding any action on their part, save gathering of power-supplies.

At last the direct attack on Mars Center was launched. For the first time, the Mirans saw one of the fifteen-foot beams. Mars' atmosphere is thin, and there is little ozone. The ultra violet beams were nearly as effective as in empty space. When the Mirans dropped their ships, a full

thirty of them, into the circle formation, Mars Center answered at once. All four beams started.

Those fifteen-foot beams, connected directly to huge atostor release apparatus, delivered a maximum power of two and three-quarter billion horsepower, each. The first Miran ship struck, sparkled magnificently, and a terrific cascade of white-hot metal rolled down from its nose. The great ship nosed down and to the left abruptly, accelerated swiftly—and crashed with tremendous energy on the plain outside of Mars Center City. White, unwavering flames licked up suddenly, and made a column five hundred feet high against the dark sky. Then the wreck exploded with a violence that left a crater half a mile across.

Three other ships had been struck, and were rapidly retreating. Another try was made for the ring formation, and four more ships were wounded, and replaced. The ring did not retreat, but the great magnetic field started. Atomic and gamma ray bombs started now, flashing sometimes dangerously close to the station as its magnetic field battled the rotating field of the ships. The four greater beams, and many smaller ones were in swift and angry action. Not more than a ten second exposure could be endured by any one ship, before it must retreat.

FOR five minutes the Mirans hung doggedly at their task. Then, wisely, they retreated. Of the fleet, not more than seven ships remained untouched. Mars Center Station had held—at what cost only they knew. Five hundred tons of their mercury had been exhausted in that brief five minutes. One hundred tons a minute had flowed into and out of the atostor ap-

paratus. Mars Center radioed for help, when the fleet lifted.

There was one other station on Mars that stood a good chance of survival, Deenmor Station, with three of the big beams installed, and apparatus for their fourth was in the station, and being rapidly worked over. McLaurin did a wise and courageous thing, at which every man on Mars cursed. He ordered that all IP stations save these two be deserted, and all mercury fuel reserves be moved to Deenmor and Mars Center.

The Mirans could not land on the North Western section of Mars, nor in the South Central region. Therefore Mars was not exactly habitable to Miran ships, because the great beams had been so perfectly figured that they were effective at a range of nearly twelve hundred miles.

Deenmor station was attacked—but it was a half-hearted attack, for Mirans were becoming distinctly skittish about fifteen foot UV beams. Two badly blistered ships—and the Mirans retreated to Jupiter. But Mira held Phobos and Diemos. In two weeks, they had set up cannon there, and proved themselves accurate long-range gunners. Against the feeble attraction of Diemos, and with Mars' gravity to help them, they began bombarding the two stations, and anything that attempted to approach them, with gamma and atomic explosive bombs. Meanwhile they amused themselves occasionally by planting a gamma-ray bomb in each of Mars' major cities. They made Mars uninhabitable for Solarians as well as for Mirans, at least until the deadly slow-action atomic explosives wore off, or were removed.

Then the Mirans, after a lapse of three weeks while they dug in their toes on Jupiter, prepared to leap.

Earth was the next goal. Miran scout-ships had been sent out before this—and severely handled by the concentrated fleets of the IP that hung grimly off Earth and Luna now. But the scouts had learned one thing. Mirans could never hope to attain a firm grasp on earth while terribly armed Luna hung like a Sword of Damocles over their heads. Further, attack on earth directly would be next to impossible, for, thanks to Faragaut's Interplanetary Company, nearly all the Mercury metal in the system was safely lodged on earth, and saturated with power. Every major city had been equipped with great UV apparatus. And neutron guns in plenty waited on small ships just outside the atmosphere to explode harmlessly any atomic or gamma bombs Miran ships might attempt to deposit.

An attack on Luna was the first step. But that terrible, gigantic fort on Luna worried them. Yet while that fort existed, earth ships were free to come and go, for Mirans could not afford to stand near. At a distance of twenty thousand miles, small Miran ships had felt the touch of those great UV beams.

Finally, a brief test-attack was made, with an entire fleet of one hundred ships. They drew almost into position, faster than light, faster than the signaling warnings could send their messages. In position, all those great ships strained and heaved at the mighty magnetic vortex that twisted at the field of the fort. Instantly, twelve of the fifteen-foot UV beams replied. And—two great UV beams of a size the Mirans had never seen before, beams from the two ships, "S Doradus" and "Cepheid."

The test-attack dissolved as suddenly as it had come. The Mirans returned to Jupiter, and to the outer

planets where they had further established themselves. Most of the Solar System was theirs. But the Solarians still held the choicest planets—and kept the Mirans from using the mild-temperated Mars.

CHAPTER IX

"THEY can't take this, at least," sighed McLaurin as they retreated from Luna.

"I didn't think they could—right away. I'm wondering though if they haven't something we haven't seen yet. Besides which—give them time, give them time."

"Well, give us time, too," snapped McLaurin. "How are you coming?"

Buck smiled. "I'm sure I don't know. I have a machine but I haven't the slightest idea of whether or not it's any good."

"Why not?"

"I can destroy—I hope—but I can't build up their ray. I can't test the machine because I haven't their ray to test it against."

"What can we do to test it?"

"The only thing I can see is to call for volunteers—and send out a six-man cruiser. If the ship's too small, they may not destroy it with the big crumbler rays. If it's too large—and the machine didn't work—we'd lose too much."

Twelve hours later, the IP men at the Lunar Bank fort were lined up. McLaurin stepped up on the platform, and addressed the men briefly, told them what was needed. Six volunteers were selected by a process of elimination, those who were married, had dependents, officers, and others were refused. Finally, six men of the IP were chosen, neither rookies nor veterans, six average men. And one average six-man cruiser, one hun-

dred and eleven feet long, twenty-two in diameter. It was the T-208, a sister ship of the T-247, the first ship to be destroyed.

The T-208 started out from Luna, and with full acceleration, sped out toward Phobos. Slowly she circled the satellite, while distant scouts kept her under view. Lazily, the Miran patrol on Phobos watched the T-208, indifferent to her. The T-208 dove suddenly, after five fruitless circles of the tiny world, and with her four-foot UV beam flaming, stabbed angrily at a flight of Miran scouts berthed in the very shadow of a great battle cruiser, one of the interstellar ships stationed here on Phobos.

Four of the little ships slumped in incandescence. Angrily the terrific sword of energy slashed at the frail little scouts.

Angrily the Miran interstellar ship shook herself abruptly into action against this insolent cruiser. The cruiser launched a flight of the mercury-torpedoes. Flashing, burning, ultra-violet energy flooded the great ship, harmlessly, for the men were, as usual protected. The Miran answered with the neutron beam, atomic and gamma bombs—and the crumbler ray.

Gently, softly a halo of shimmering violet luminescence built up about the T-208. The UV beam continued to flare, wavering slightly in its aim—then fell way off to one side. The T-208 staggered suddenly, wandered from her course—whole, but uncontrolled. For the men within the ship were dead.

Majestically the Miran swung along beside the dead ship, a great magnetic tow-cable shot out toward it, to shy off at first, then slowly to be adjusted, and take hold in the magnetic shield of the T-208. The pilots of

the watching scout-ships turned away. They knew what would happen.

It did. Five—ten—twenty seconds passed. Then the "dead-man" took over the ship—and the stored power in the atostor tanks blasted in a terrible flame that shattered the metal hull to molecular fragments. The interstellar cruiser shuddered, and rolled half over at the blasting pressure. Leaking seams appeared in her plates.

The scouts raced back to Luna as the Miran settled heavily, and a trifle clumsily to Phobos. Miran radio-beams were forcing their way out toward the Miran station on Europa, to be relayed to the headquarters on Jupiter, just as Solarian radio beams were thrusting through space toward Luna. Said the Miran messages: "Their ships no longer crumble." Said the Solarian messages: "The ships no longer crumble—but the men die."

HIS deep eyes burning tensely, Buck Kendall heard the messages coming in, and rose slowly from his seat to pace the floor. "I think I know why," he said at last. "I should have thought. For that too can be prevented."

"Why—what in the name of the Planets?" asked McLaurin. "It didn't kill the men in the forts—why does it kill the men in the ships, when the ships are protected?"

"The protection kills them."

"But—but they had the protective oscillations on all the way out!" protested the Commander.

"Think how it works though. Think, man. The Enemy's field is an electric-field oscillation. We combat it by setting up a similar oscillating field in the metal of the hull ourselves. Because the metal conducts the

strains, they meet, and oppose. It is not a shield—a shield is impossible, as I have said, because of energy concentration factors. If their beam carried a hundred thousand horsepower in a ten-foot square beam, in every ten square feet of our shield, we'd have to have one hundred thousand horsepower. In other words, hundreds of times as much energy would be needed in the shield, as they used in their beam. We can't afford that. We have to let the beams oppose our oscillations in the metal, where, because the metal conducts, they meet on an equal basis. But—when two oscillations of slightly different frequency meet, what is the result?"

"In this case, a heterodyne frequency of a lower, and harmless frequency."

"So I thought. I was partly right. It does *not* harm the metal. But it kills the men. It is super-sonic. The terrible, shrill sounds destroy the cells of the men's bodies. Then, when their dead hands release the controls, the automatic switches blow up the ship."

"God! We stop one menace—and it is like the Hydra. For every head we lop off, two spring up."

"Ah—but they are lesser heads. Look, what is the fundamental difference between sound and light?"

"One is a vibration of matter and the—ah—eliminate the material contact!"

"Exactly! All we need to do is to let the ships operate airless, the men in space ships. Then the air cannot carry the sounds to them. And by putting special damping materials in their suits, we can stop the vibrations that would reach them through their feet and hands. Another six-man ship must go out—but this ship will come back!"

And with the order for another experimental ship, went the orders for commercial supplies of this new apparatus. Every IP ship must be equipped to resist it.

Buck Kendall sailed on the six-man scout that went out this time. Again they swooped once at Phobos, again Miran scout-ships crumbled under the attack of the vicious UV beams. The Mirans were not waiting contemptuously this time. In an instant the great interstellar ship rose from its berth, its weapons working angrily. The crumbler ray snapped out at the T-253.

Kendall stared into the periscope visor intently. Clumsily his padded hands worked at the specially adapted controls. The soft hiss of the oxygen release into his suit disturbed him slightly. The radio-phones in his helmet carried all the conversations in the ship to him with equal clarity. He watched as the great ship angled angrily up—

His vision was momentarily obscured by a violet glow that built up and reached out gently from every point of metal in the ship. The instant Kendall saw that, the T-253 was fleeing under his hands. The test had been made. Now all he desired was safety again. The ion-rockets flared recklessly as, crushed under an acceleration of four earth-gravities, he sank heavily into his seat. Grimly the Miran ship was pursuing them, easily keeping up with the fleeing midget. The crumbler became more intense, the violet glow more vivid.

The UV beam was reaching out directly behind now. The—

With a cry of agony, Kendall ripped the radio-phone connection out of his suit. A soft hiss of leaking air warned him of too great violence only minutes later. For his ears had been

deafened by the sudden shriek of a tremendous signal from outside!

Instantly Kendall knew what that meant. And he could not communicate with his men! There was no metal in these special suits, even the oxygen tanks were made of synthetic plastics of tremendous strength. No scrap of vibrating metal was permissible. The padded gloves and boots protected him—but there was a new and different type of crackle and haze from the metal points now. It was almost invisible in the practically airless ship, but Kendall saw it.

Presently he felt it, as he desperately increased his acceleration. Slow creeping heat was attacking him. The heat was increasing rapidly now. Desperately he was working at the crumbler-protection controls—but immediately set them back as they were. He had to have the crumbler protection as well—!

G RIMLY the great Miran ship hung right beside them. Angrily the two four-foot UV beams flashed back—seeking some weak spot. There were none. At her absolute maximum of acceleration the little ship plunged on. Gamma and atomic bombs were washing her in flame. The heavy blocks of paraffine between her walls were long since melted, retained only by the presence of the metal walls. Smoke was beginning to filter out now, and Kendall recognized a new, and deadlier menace! Heat—quantities of heat were being poured into the little ship, and the neutron guns were doing their best to add to it. The paraffine was confined in there—and like any substance, it could be volatilized, and as a vapor, develop pressure—explosive pressure!

The Miran seemed satisfied in his tactics so far—and changed them.

Forty-seven million miles from earth, the Miran simply accelerated a bit more, and crowded the Solarite ship a bit. White faced, Buck Kendall was forced to turn a bit aside. The Miran turned also. Kendall turned a bit more—

Flashing across his range of vision at an incredible speed, a tiny thing, no more than twenty feet long and five in diameter, a scout-ship appeared. Its tiny nose ultra violet beam was blasting a solid cylinder of violet incandescence a foot across in the hull of the Miran—and, to the Miran, angling swiftly across his range of vision. Its magnetic field clashed for a thousandth of a second with the T-253, instantly meeting, and absorbing the fringing edges. Then—it swept through the Miran's magnetic shield as easily. The delicate instruments of the scout instantaneously adjusted its own magnetic field as much as possible. There was resistance, enormous resistance—the ship crumpled in on itself, the tail vanished in dust as a sweeping crumbler beam caught it at last—and the remaining portion of the ship plowed into the nose of the Miran.

The Miran's force-control-room was wrecked. For perhaps a minute and a half, the ship was without control, then the control was re-established—and in vain the telescopes and instruments searched for the T-253. Lightless, her rockets out now, her fields damped down to extinction, the T-253 was lost in the pulsing, gyrating fields of half a dozen scout-ships.

Kendall looked grimly at the crushed spot on the nose of the Miran. His ship was drifting slowly away from the greater ship. Presently, however, the Miran put on speed in the direction of earth, and the T-253 fell far behind. The Miran was not

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seriously injured. But that scout pilot, in sacrificing life, had thrown dust in their eyes for just those few moments Kendall had needed to lose a lightless ship in lightless space—lightless—for the Mirans at any rate. The IP ships had been covered with a black paint, and in no time at all, Kendall had gotten his ship into a position where the energy radiations of the sun made him undetectable from the Miran's position, since the radiation of his own ship, even in the heat range, was mingled with the direct radiation of the sun. The sun was in the Miran's "eyes," both actual and instrumental.

An hour later the Miran returned, passed the still-lightness ship at a distance of five million miles, and settled to Phobos for the slight repairs needed.

Twelve hours later, the T-253 settled to Luna, for the many rearrangements she would need.

"I rather knew it was coming," Kendall admitted sadly, "but danged if I didn't forget all about it. And—cost the life of one of the finest men in the system. Johnson's family get a permanent pension just twice his salary, McLaurin. In the meantime—"

"What was it? Pure heat, but how?"

"Pure radio. Nothing but short-wave radio directed at us. They probably had the apparatus, knew how to make it, but that's not a good type of heat ray, because a radio tube is generally less than eighty percent efficient, which is a whale of a loss when you're working in a battle, and a whale of an inconvenience. We were heated only four times as much as the Miran. He had to pump that heat into a heat-reservoir—a water tank probably—to protect himself. Highly in-

efficient and ineffective against a large ship. Also, he had to hold his beam on us nearly ten minutes before it would have become unbearable. He was again, trying to kill the men, and not the ship. The men are the weakest point, obviously."

"Can you overcome that?"

"Obviously, no. The thing works on pure energy. I'd have to match his energy to neutralize it. You know it's an old proposition, that if you could take a beam of pure, monochromatic light and divide it exactly in half, and then recombine it in perfect interference, you'd have annihilation of energy. Cancellation to extinction. The trouble is, you never do get that. You can't get monochromatic light, because light can't be monochromatic. That's due to the Heisenberg Uncertainty—my pet bug-bear. The atom that radiates the light, must be moving. If it isn't, the emission of the light itself gives it a kick that moves it. Now, no matter what the quantum *might* have been, it loses energy in kicking the atom. That changes the situation instantly, and incidentally the 'color' of the light. Then, since all the radiating atoms won't be moving alike, etc., the mass of light can't be monochromatic. Therefore perfect interference is impossible.

"The way that relates to the problem in hand, is that we can't possibly destroy his energy. We can, as we do in the crumbler stunt, change it. He can't, I suspect, put too much power behind his crumbler, or he'd have crumbling going on at home. We get a slight heating from it, anyway. Into the bargain, his radio was after us, and his neutrons naturally carried energy. Now, no matter what we do, we've got that to handle. When we fight his crumbler, we actually add heat-energy to it, our-

selves, and make the heating effect just twice as bad. If we try to heterodyne his radio—presto—it has twice the heat energy anyway, though we might reduce it to a frequency that penetrated the ship instead of all staying in it. But by the proposition, we have to use as much energy, and in fact, remember the 80% rule. We've got to take it and like it."

"But," objected McLaurin, "we don't like it."

"Then build ships as big as his, and he'll quit trying to roast you. Particularly if the inner walls are synthetic plastics. Did you know I used them in the 'S Doradus' and 'Cephid'?"

"Yes. Were you thinking of that?"

"No—just luck—and the fact that they're light, strong as steel almost, and can be manufactured in forms much more quickly. Only the outer hull is tungsto-beryllium. The advantage in this will be that nearly all the energy will be absorbed outside, and we'll radiate pretty fast, particularly as that tungsto-beryllium has a high radiation-factor in the long heat range."

"What does that mean?"

"Well, ordinary polished silver is a mighty poor radiator. Homely example: Try waiting for your coffee to cool if it's in a polished silver pot. Then try it in a tungsto-beryllium pot. No matter how you polish that tungsto-beryllium, the stuff WILL radiate heat. That's why an IP ship is always so blamed cold. You know the passenger ships use polished aluminum outer walls. The big help is, that the tungsto-beryllium will throw off the energy pretty fast, and in a big ship, with a whale of a lot of matter to heat, the Strangers will simply give up the idea."

"Yes, but only two ships in the system compare with them in size."

"Sorry—but I didn't build the IP fleet, and there are lots of tungsten and beryllium on earth. Enough anyway."

"Will they use that beam on the fort? And can't we use the thing on them?"

"They won't and we won't—though we could. A hank of those new million watt tubes—perhaps a hundred of them—and we'd have a pretty effective heater—but an awful waste of power. I've got something better."

"New?"

"Somewhat. I've found out how to make the mirror field in a plate of metal, instead of a block. Come on to the lab, and I'll show you."

"What's the advantage? Oh—weight saved, and silver metal saved."

"A lot more than that, Mac. Watch."

AT the laboratory, the new apparatus looked immensely lighter and simpler than the old. The atostor, the ionizer, and the twin ion-projectors were as before, great, rigid, metal structures that would maintain the meeting point of the ions with inflexible exactitude under any acceleration strains. But now, instead of the heavy silver block in which a mirror was figured, the mirror consisted of a polished silver plate, parabolic to be sure, but little more than a half-inch in thickness. It was mounted in a framework of complex, stout metal braces.

Kendall started the ion-flame at low intensity, so the UV beam was little more than a spotlight.

"You missed the point, Mac. Now—watch that tungsto-beryllium plate. I'll hold the power steady. It's an

eighteen inch beam—and now the energy is just sufficient to heat that tungsten plate to bright red. But—" Kendall turned over a small rheostat control—and abruptly the eighteen inch diameter spot on the tungstoberyllium plate began contracting, it contracted till it was a blazing, sparkling spot of molten incandescence less than an inch across!

"That's the advantage of focus. At this distance of a few hundred feet with a small beam I can do that. With a twenty-foot beam, I can get a two-foot spot at a distance of nearly ten miles! That means that the receiving end will have the pleasure of handling *one hundred times the energy concentration*. That would punch a hole through most anything. All you have to do is focus it. The trouble being, if it's out of focus the advantage is more than lost. So if there's any question about getting the focus, we'll get along without it."

"A real help, if you do. That would punch a hole before the Stranger ship could turn away as they do now."

Kendall nodded. "That's what I was after. It is mainly for the forts though. We'll have to signal the dope to the Mars Center and Deenmor stations. They can fix it up, themselves. In the meantime—all we can do is hold on and hunt, and let's hope better than the Strangers do."

CHAPTER X

SADLY the convalescent Gresth Gkæ listened to the reports of his lieutenants. More and more disgraced he felt as he realized how badly he had blundered in reporting the people of this system unable to cope with the attackers' weapons. Gresth Gkæ looked up at his old friend and physician, Merth Skahl.

He shook his head slowly. "I'm afraid, Merth Skahl. I am afraid. We have, perhaps, made a mistake. The better and the stronger alone should rule. Aye, but is the *stronger* always the *better*? I am afraid we have mistaken the Truth in assuming this. If we have—then may Jarth, Lord of Truth and Wisdom punish us. Mighty Jarth, if I have mistaken in following my judgments, it is not from disobedience, it is lack of Thy knowledge. The strongest—they are not always the better, are they?"

Merth Skahl bent sharply over his friend. "Quiet thyself, Gresth Gkæ. You know, and I know, you have done only your best, and surely Jarth himself can ask no better of any one. You must rest, for only by rest can those terrible burns be healed. All your *stheen* over half the body-area was burned off. You have been delirious for many days."

"But Merth Skahl, think—have we disobeyed Jarth's will? It is, we know, his will that only the best and the strongest shall rule—but are the best always the strongest? An imbecile adult could destroy the life of a genius-grade child. The strongest wins, but not the best. Such would not be the will of Jarth. If we be the stronger, *and* the best, then it is right and just that these strange creatures should be destroyed that we may have a stable world of stable light and heat. But look and see, with what terrible swiftness these strange creatures have learned! May it not be they are the better race—that it is *we* who are the weaker and the poorer? Can it be that Jarth has brought us together that these people might learn—and destroy us? If they be the stronger, and the better—then may Jarth's will be done. But we must test our strength to the utmost.

I must rise, and go to my laboratory soon. They have set it up?"

"Aye, they have, Gresth Gkae. But remember, the weak and the sick make faults the strong and the well do not. Better that you rest yourself. There is little you can do while your body seeks to recover from these terrible burns."

"You are wrong, my friend, wrong. Don't you see that my mind is clear—that it is the mind which must fight in these battles, for surely the man is weak against such things as this infra-X-radiation? Why, I am better able to fight now than are you, for I am a trained fighter of the mind, while you are a trained healer of the body. These strange beings with their stiff arms and legs, their tender skins, and—and their swift minds have fought us all too well. If we must test, let it be a test. I have heard how they so quickly solved the riddle of the crumbling field. That took us longer, and we designed it. The Counsel of Worlds put me in command—let me up, Merth Skahl, I must work."

Concerned, the physician looked down at him. Finally he spoke again. "No, I will not permit you to leave the hospital-ship. You must stay here, but if, as you have said, the mind is what must fight, then surely you can fight well from here, for your mind is here."

"No, I cannot, and you well know it. I may shorten my life, but what matter. 'Death is the end toward which the chemical reaction, Life, tends,'" quoted the scientist. "You know I have left my children—my immortality is assured through them. I can afford to die in peace, if it assures their welfare. Time is precious, and while my mind might work from here, it must have data on which to work. For that, I must go

to the laboratories. Help me, Merth Skahl."

Reluctantly the physician granted the request, but begged of Gresth Gkae a promise of at least six hours rest in every fifteen, and a good sleep of at least twenty-seven hours every "night." Gresth Gkae agreed, and from a wheel-chair, conducted his work, began a new line of experimentation he hoped would yield them the weapon they needed. Under him, the staff of scientists worked, aiding and advising and suggesting. The apparatus was built, tested, and found wanting. Time and again as the days passed, they watched Gresth Gkae, gaining strength very, very slowly, taken away despondent at the end of his forty hours of work.

A dozen expeditions were sent to Jupiter's poles to watch and measure and study the tremendous auroral displays there, where Jupiter's vast magnetic field sucked in countless quintillions of the flying electrons from the sun, and brought them circling in, in a vast, magnificent display of auroral ionization.

EXPEDITIONS went to the great Southern Plateau, the Plateau of Storms, where the titanic air currents resulted in an everlasting display of terrific lightnings, great burning balls of electric force floating dangerous and deadly across the frozen, ultra-cold plain.

And the expeditions brought back data. Yet still Gresth Gkae could not sleep soundly, his thoughts intruding constantly. Hours Merth Skahl spent with him, calming him to sleep.

"But what is this constant search? It is little enough I know of science, but why do you send our men to these spots of wonderfully beautiful, but useless natural forces. Can we some-

how, do you think, turn them against the people of these worlds?"

Softly the old Miran smiled. "Yes, you might say so. For look, it is the strange balls of electric force I want to know about. Sthor had few, but occasionally we saw them. Never were they properly investigated. I want to know their secret, for I am sure they are balls of electric forces not vastly dissimilar from the nucleus of the atom. Always we have known that no system of purely electrical forces could remain stable. Yet these strange balls of energy do. How is it? I am sure it will be of vast importance. But the direct secret I hope to learn is in this: What can be done with electric fields can nearly always be duplicated, or paralleled in magnetic fields. If I can learn how to make these electric balls of energy, can I not hope to make similar magnetic balls of energy?"

"Yes, I see—that would seem true. But what benefit would you derive from that? You have magnetic beams now, and yet they are useless because you can get nowhere near the forts, and destroy them. How then would these benefit you?"

"We can do nothing to those forts, because of that magnetic shield. Could we once break it down, then the fort is helpless, and one or two small atomic bombs destroy it. But—we cannot stay near, for the terrible infra-X-rays of theirs burn holes in our ships, and—in our men."

"But look you. I can drop many atomic bombs from a distance where their beams are ineffective. Suppose I do make a magnetic ball of energy, a magnetic bomb. Then—I can drop it from a distance! We have learned that the power supply of these forts is very great—but not endless, as is ours now, thanks the vast supplies

of power metal on this heavy planet. Then all we need do is stay at a distance where they cannot reach us—and drop magnetic bombs. Ah, they will be stopped, and their energy absorbed. But we can keep it up, day after day, and slowly drain out their power. Then—then our atomic bombs can destroy those forts, and we can move on!" But suddenly the animation and strength left his voice. He turned a sad, downcast face to his friend. "But Merth Skahl, we can't do it," he complained.

"Ah—now I can see why you so want to continue this wearing and worrying work. You need time. Gresth Gkae, only time for success. Tomorrow it may be that you will see the first hint that will lead you to success."

"Ah—I only hope it, Merth Skahl, I only hope it."

But it was the next day that they saw the first glimpse of the secret, and saw the path that might lead to hope and success. In a week they were sending electric bombs across the laboratory. And in three days more, a magnetic bomb streaked dully across the laboratory to a magnetic shield they had set up, and buried itself in it, to explode in brilliant light and heat.

FROM that day Gresth Gkae began to mend. In the three weeks that were needed to build the apparatus into ships, he regained strength so that when the first flight of five great interstellar ships rose from Jupiter, he was on the flagship.

To Phobos they went first, to the little inner satellite of Mars, scarcely eight miles in diameter, a tiny bit of broken metal and rock, utterly airless, but scarcely more than 3700 miles from the surface of Mars below. The

Mars Center and Deenmor forts were wasting no power raying a ship at that distance. They could, of course, have damaged it, but not severely enough to make up for the loss of their strictly limited power. The photo-cells had been working overtime, every minute of available light had been used, and still scarcely 2100 tons of charged mercury remained in the tanks of Mars Center and 1950 in the tanks at Deenmor.

The flight of five ships settled comfortably upon Phobos, while the three relieved of duty started back to Jupiter. Immediately work was begun on the attack. The ships were first landed on the near side, while the apparatus of the projectors was unloaded, then the great ships moved around to the far side. Phobos of course rotated with one face fixed irrevocably toward Mars itself, the other always to the cold of space. Great power leads trailed beneath the ships, and to the dark side. Then there were huge water lines for cooling. On this almost weightless world, where the great ships weighing hundreds of thousands of tons on a planet, weighed so little they were frequently moved about by a single man, the laying of five miles of water conduit was no impossibility.

Then they were ready. Mars Center came first. Automatic devices kept the aim exact, as the first of the magnetic bombs started down. At five second intervals they were projected outward, invisible globes of concentrated magnetic energy, undetectable in space. Seven seconds passed before the first became dimly visible in the thin air of Mars. It floated down, it would miss the fort it seemed—so far to one side—. Abruptly it turned, and darted with tremendously accelerating speed for the great mag-

netic field of the fort. With a vast blast of light, it exploded. Five seconds later a second exploded. And a third.

Mars Center signaled scoffingly that the bombs were all being stopped dead in the magnetic atmosphere, after the bombardment had been witnessed from earth and Luna. An hour later they gave a report that they were concentrated magnetic fields of energy that would be rather dangerous—if it weren't that they couldn't even stand into the magnetic atmosphere. Three hours later Mars Center reported that they contained considerably more energy than had at first been thought. Further, which they had not carefully considered at first, they were taking energy with them! They were taking away about an equal amount of energy as each blew up.

It was only a half hour after that that the men at Mars Center realized perfectly what it meant. Their power was being drained just a little bit better than twice as fast as they generated during the day—and since Phobos spun so swiftly across the sky.

Deenmor got the attack just about the time Mars Center was released. Deenmor immediately began seeking for the source of it. Somewhere on Phobos—but where?

The Mirans were experts at camouflage. Deenmor Station, realizing the menace, immediately rayed the "projector." They tore up a great deal of harmless rock with their huge UV rays. But the bomb device continued to throw one bomb each five seconds.

When Deenmor operated from Phobos' position, Mars Center was exposed to the deadly, constant drain. A day or two later, the bombs were

coming one each second and a half, for more ships had joined in the work on Phobos.

Gresth Gkæ saw the work was going nicely. He knew that now it was only a question of time before those magnetic shields would fail—and then the whole fort would be powerless. Maybe—it might be a good idea, when the forts were powerless to investigate instead of blowing them up. There might be many interesting and worthwhile pieces of apparatus—particularly the UV beams apparatus.

CHAPTER XI

BUCK KENDALL entered the Communications room rather furtively. He hated the place. Cole was there, and McLaurin. Mac was looking tired and drawn, Cole not so tired, but equally drawn. The signals were coming through fairly well, because most of the disturbance was rising where the signals rose, and all the disturbance, practically, was magnetic rather than electric.

"Deware is sending, Buck," McLaurin said as he entered. "They're down to the last fifty-five tons. They'll have more time now—a rest while Phobos sinks. Mars Center has another 250 tons, but—it's just a question of time. Have you any hope to offer?"

"No," said Kendall in a strained voice. "But, Mac, I don't think men like those are afraid to die. It's dying uselessly they fear. Tell 'em—tell 'em they've defended not alone Mars, but all the system, in holding up the Strangers on Mars. We here on Luna have been safer because of them. And tell—Mac, tell them that in the meantime, while they defended us, and gave us time to work, we have begun

to see the trail that will lead to victory."

"You have!" gasped McLaurin.

"No—but they will never know!" Kendall left hastily. He went and stood moodily looking at the calculator machines—the calculator machines that refused to give the answers he sought. No matter how he might modify that original idea of his, no matter what different line of attack he might try in solving the problems of Space and Matter, while he used the system he *knew* was right—the answer came down to that deadly, hope-blasting expression that meant only "uncertain."

Even Buck was beginning to feel uncertain under that constant crushing of hope. Uncertainty—uncertainty was eating into him, and destroying—

From the Communications room came the hum and drive of the great sender flashing its message across seventy-two millions of miles of nothing. "B-u-c-k K-e-n-d-a-l-l s-a-y-s h-e-h-a-s l-e-a-r-n-e-d s-o-m-e-t-h-i-n-g t-h-a-t w-i-l-l l-e-a-d t-o v-i-c-t-o-r-y w-h-i-l-e y-o-u h-e-l-d b-a-c-k t-h-e—"

Kendall switched on a noisy, humming fan viciously. The too-intelligible signals were drowned in its sound.

"And—tell them to—destroy the apparatus before the last of the power is gone," McLaurin ordered softly.

The men in Deenmor station did slightly better than that. Gradually they cut down their magnetic shield, and some of the magnetic bombs tore and twisted viciously at the heavy metal walls. The thin atmosphere of Mars leaked in. Grimly the men waited. Atomic bombs—or ships to investigate? It did not matter much to them personally—

Gresth Gkæ smiled with his old vigor as he ordered one of the great interstellar ships to land beside the powerless station, approaching from such an angle that the still-active Mars-center station could not attack. One of the fleet of Phobos rose, and circled about the planet, and settled gracefully beside the station. For half an hour it lay there quietly, waiting and watching. Then a crew of two dozen Mirans started across the dry, crumbly powder of Mars' sands, toward the fort. Simultaneously almost, three things happened. A three-foot UV beam wiped out the advancing party. A pair of fifteen foot beams cut a great gaping hole in the wall of the interstellar ship, as it darted up, like a startled quail, its weapons roaring defiance, only to fall back, severely wounded.

And the radio messages pounded out to earth the first description of the Miran people. Methodically the men in Deenmor station used all but one ton of their power to completely and forever wreck and destroy the interstellar cripple that floundered for a few moments on the sands a bare mile away. Presently, before Deenmor was through with it, the atomic bombs stopped coming, and the atomic shells. The magnetic shield that had been reestablished for the few minutes of this last, dying sting, fell.

Deenmor station vanished in a sudden, colossal tongue of blue-green light as the ton of atomically distorted mercury was exploded by a projector beam turned on the tank.

IT was long gone, when the first atomic bombs and magnetic bombs dropped from Phobos reached the spot, and only hot rock and broken metal remained.

Mars Center failed in fact the next time Phobos rode high over it. The apparatus here had been carefully destroyed by technicians with a view of making it indecipherable, but the Mirans made it even more certain, for no ship settled here to investigate, but a stream of atomic bombs that lasted for over an hour, and churned the rock to dust, and the dust to molten lava, in which pools of fused tungsto-beryllium alloy bubbled slowly and sank.

"Ah, Jarth—they are a brave race, whatever we may say of their queer shape," sighed Gresth Gkæ as the last of Mars Center sank in bubbling lava. "They stung as they died." For some minutes he was silent.

"We must move on," he said at length. "I have been thinking, and it seems best that a few ships land here, and establish a fort, while some twenty move on to the satellite of the third planet and destroy the fort there. We cannot operate against the planet while that hangs above us."

Seven ships settled to Mars, while the fleet came up from Jupiter to join with Gresth Kkæ's flight of ships on its way to Luna.

An automatically controlled ship was sent ahead, and began the bombardment. It approached slowly, and was not destroyed by the UV beams till it had come to within 40,000 miles of the fort. At 60,000 Gresth Gkæ stationed his fleet—and returned to 150,000 immediately as the titanic UV beams of the Lunar Fort stretched out to their maximum range. The focus made a difference. One ship started limping back to Jupiter, in tow of a second, while the rest began the slow, methodical work of wearing down the defenses of the Lunar Fort.

Kendall looked out at the mag-

nificent display of clashing, warring energies, the great, whirling spheres and discs of opalescent flame, and turned away sadly. "The men at Deenmor must have watched that for days. And at Mars Center."

"How long can we hold out?" asked McLaurin.

"Three weeks or so, at the present rate. That's a long time, really. And we can escape if we want to. The UV beams here have a greater range than any weapon the Strangers have, and with earth so near—oh we could escape. Little good."

"What are you going to do?"

"I," said Buck Kendall, suddenly savage, "am going to consign all the math. machines in the universe to eternal damnation—and go ahead and build a machine anyway. I *know* that thing ought to be right. The math's wrong."

"There is no other thing to try?"

"A billion others. I don't know how many others. We ought to get atomic energy somehow. But that thing infuriates me. A hundred things that math. has predicted, that I have checked by experiment, simple little things. But—when I carry it through to the point where I can get something useful—it wriggles off into—uncertainty."

Kendall stalked off to the laboratory. Devin was there working over the calculus machines, and Kendall called him angrily. Then more apologetic, he explained it was anger at himself. "Devin, I'm going to make that thing, if it blows up and kills me. I'm going to make that thing if this whole fort blows up and kills me. That math. has blown up in my face for four solid months, and half killed me, so I'm going to kill it. Come on, we'll make that damned junk."

Angrily, furiously, Kendall drove

his helpers to the task. He had worked out the apparatus in plan a dozen times, and now he had the plans turned into patterns, the patterns into metal.

SAUCILY, the "S Doradus" made the trip to and from earth with patterns, and with metal, with supplies and with apparatus. But she had to dodge and fight every inch of the way as the Miran ships swooped down angrily at her. A swift, fighting craft could get through when the Miran fleet was withdrawn to some distance, but the Mirans were careful that no heavy-loaded freighter bearing power supply should get through.

And Gresth Gkæ waited off Luna in his great ship, and watched the steady streams of magnetic bombs exploding on the magnetic shield of the Lunar Fort. Presently more ships came up, and added their power to the attack, for here, the photo-cell banks could gather tremendous energy, and Gresth Gkæ knew he would need to overcome this, and drain the accumulated power.

Gresth Gkæ felt certain if he could once crack this nut, break down earth, he would have the system. This was the home planet. If this fell, then the two others would follow easily, despite the fact that the few forts on the innermost planet, Mercury, could gather energy from the sun at a rate greater than their ships could generate.

It took Kendall two weeks and three days to set up his preliminary apparatus. They had power for perhaps four days more, thanks to the fact that the long Lunar day had begun shortly after Gresth Gkæ's impatient attack had started. Also, the "S Doradus" had brought in several hundred tons of charged mercury on

each trip, though this was no great quantity individually, it had mounted up in the ten trips she had made. The "Cepheid," her sister ship, had gone along on seven of the trips, and added to the total.

But at length the apparatus was set up. It was peculiar looking, and it employed a great deal of power, nearly as much as a UV beam in fact. McLaurin looked at it sceptically toward the last, and asked Buck: "What do you expect it to do?"

"I am," said Kendall sourly, "uncertain. The result will be uncertainty itself."

Which, considering things, was a surprisingly accurate statement. Kendall gave the exact answer. He meant to give an ironic comment. For the mathematics had been perfectly correct, only Buck Kendall misinterpreted the answer.

"I've followed the math. with mechanism all the way through," he explained, "and I'm putting power into it. That's all I know. Somewhere, by the laws of cause and effect, this power must show itself again—despite what the damn math. says."

And in that of course, Kendall was wrong. Because the laws of cause and effect didn't hold in what he was doing now.

"Do you want to watch?" he asked at length. "I'm all set to try it."

"I suppose I may as well," smiled McLaurin. "In our close-knit little community the fate of one is of interest to all. If it's going to blow up, I might as well be here, and if it isn't I want to be."

Kendall smiled appreciatively and replied: "Let it be on thy own head. Here she goes."

He walked over to the power board, and took command. Devin, and a squad of other scientists were seated

about the room with every conceivable type and combination of apparatus. Kendall wanted to see what this was doing. "Tubes," he called. "Circuits A and D. Tie-ins," he stopped, the preliminary switches in. "Main circuit coming." With a jerk he threw over the last contact. A heavy relay thudded solidly. The hum of a straining atostor. Then—

An electric motor, humming smoothly stopped with a jerk. "This," it remarked in a deep throaty voice, "is probably the last stand of humanity."

The galvanometer before which Devin was seated apparently agreed. In a rather high pitched voice it pointed out that: "If the Lunar Fort falls, the earth—" it stopped abruptly, and an electroscope beside Douglass took up the thread in a high, shrill voice, rather slurred. "—will be directly attacked."

"This," resumed the motor in a hoarse voice. "will certainly mean the end of humanity." The motor gave up the discourse and hummed violently into action—in reverse!

"My God!" Kendall pulled the switch open with a sagging jaw and staring eyes.

THE men in the room burst into sudden startled exclamations.

Kendall didn't give them time. His jaw snapped shut, and a blazing light of wonderous joy shone in his eyes. He instantly threw the switch in again. Again the humming atostor, the strain—

Slowly Devin lifted from his seat. With thrashing arms and startled, staring eyes, he drifted gently across the room. Abruptly he fell to the floor, unhurt by the light Lunar gravity.

"I advise," said the motor in its

grumbling voice, "an immediate exodus." It stopped speaking, and practiced what it preached. It was a fifty-horse moto-generator, on a five-ton tungsto-beryllium, base, but it rose abruptly, spun rapidly about an axis at right angles to the axis of its armature, and stopped as suddenly. In mid air it continued its interrupted lecture. "Mercury therefore is the destination I would advise. There power is sufficient for—all machines." Gently it inverted itself and settled to the middle of the floor. Kendall instantly cut the switch. The relay did not chunk open. It refused to obey. Settled in the middle of the floor now, torn loose from its power leads, the moto-generator began turning. It turned faster and faster. It was shrilling in a thin scream of terrific speed, a speed that should have torn its windings to fragments under the lash of centrifugal force. Contentedly it said throatily. "Settled."

The galvanometer spoke again in its peculiar harsh voice. "Therefore, move." Abruptly, without apparent reason, the stubborn relay clicked open. The shrilly screaming motor stopped dead instantly, as though it had had no real momentum, or had been inertialess.

Startled, white-faced men looked at Kendall. Buck's eyes were shining with an unholy glee.

"*Uncertainty!*" he shouted. "Uncertainty — uncertainty — uncertainty, you fools! Don't you see it? All the math.—it said uncertainty — man, man—we've got just that—uncertainty!"

"You're crazy," gasped McLaurin. "I'm crazy, everything's gone crazy."

Kendall roared with sudden, joyous laughter. "Absolutely. Everything goes crazy—the laws of nature break

down! Heisenberg's principle showed that the law of cause and effect weren't absolute. We've made them absolutely uncertain!"

"But—but motors *talking*, instruments giving lectures—"

"Certainly—or rather uncertainly—anything, absolutely anything. The destruction of the laws of gravity, freedom from inertia—why merely picking up a radio lecture is nothing!"

Suddenly, abruptly, a thousand questions poured in on him. Jubilantly he answered what he could, told what he thought—and then brought order. "The battle's still on, men—we've still got to find out how to use this, now we've got it. I have an idea—that there's a lot more. I know what I'll get this time. Now help me remake this apparatus so we don't broadcast the thing."

At once, ten times the former pace, work was done. On the radio, news was sent out that Kendall was on the right track after all. In two hours the apparatus had been vastly altered, it was in the final stage, and an entirely different sort of field set up. Again they watched as Buck applied the power.

The atostor hummed—but no strange tricks of matter happened this time. The more concentrated, altered field was, as Buck was to find out later, "Uncertainty of the Second Degree." It was molecular uncertainty. In a field a foot and a half in diameter. Buck saw the thing created—and suddenly a brilliant green-blue flame shot up, and a great dark cloud of terrible, red-brown deadly vapor. Then an instant later, Kendall had opened the relay. Gasping, the men ran from the laboratory, shutting the deadly fumes in. "N.O."

gasped Morton, the chemist, as they reached safety. "It's exothermic—but it formed there!"

IN that instant, Kendall grasped the meaning of the choking fumes carried. "Molecular uncertainty!" he decided. "We're going back—we're getting there—"

He altered the apparatus again, added another atostor in series, reduced the size of his sphere of forces—of strange chaos of uncertainty. Within—little was certain. Without—the laws of nature applied as ever.

Again the apparatus was started, cautiously this time. Only a strange jumbled ionization appeared this time, then a slow, rising blue flame began to creep up, and burn hot and blue. Buck looked at it for a moment, then his face grew tense and thoughtful. "Devin—give me a half-dollar." Blankly, Devin reached in his pocket, and handed over the metal disc. Cautiously Buck Kendall tossed it toward the sphere of force. Instantly there was a flash of flame, soundless and soft-colored. Then the silver disc was outlined in light, and swiftly, inevitably crumbling into dust so fine only a blue haze appeared. In less than two seconds, the metal was gone. Only the dense blue fog remained. Then this began to go, and the leaping blue flame grew taller, and stronger.

"We're on the track—I'm going to stop here, and calculate. Bring the data—"

Kendall shut off the machine, and went to the calculation room. Swiftly he selected already prepared graphs, graphs of the math. he had worked on. Devin came soon, and others. They assembled the data and with tables and arithmetical machines turned it into graphs.

Then all these graphs were fed into the machine. There were curves, and sine-curves, abrupt breaking lines—but the answer that came but when all were compounded was a perfect diagram of a flight of four steps, descending in unequal treads to zero.

Kendall looked at it for long minutes. "That," he said at length, "is what I expected. There are four degrees of uncertainty, we generated 'Uncertainty of the First Degree,' 'Mass Uncertainty' when we started. That, as here shown, takes little energy concentration. Then we increased the energy concentration and got 'Uncertainty of the Second Degree,' 'Molecular Uncertainty.' Then I added more power, and reduced the field, and got 'Uncertainty of the Third Degree'—'Atomic Uncertainty.' There is 'Uncertainty of the Fourth Degree' It is barely attainable with our atostors. It is—utter uncertainty."

"In the First Degree, the laws of mass action fail, the great broad-reaching laws. In the Second Degree, the laws of the molecules, a finer organization, break down, and anything can happen in chemistry. In the Third Degree, the laws of atomic physics break down slowly. The atom is tough. It is very compact, and we just barely attained the concentration needed with that apparatus. But—in the Third Degree, when the Atomic Laws break down into utter uncertainty, the atoms break, and only hydrogen can exist. That was the blue flame."

"But the Fourth Degree—*there is no law whatsoever*, nothing in all the Universe can exist. It means—the utter destruction and release of the energy of matter!" Kendall paused for a moment. "We have won, with this. We need only make up this apparatus—and maybe make it into a

weapon. You know, in the Fourth Degree, nothing in all the Universe could resist, deflect, or control it, if launched freely, and self-maintaining. I think that might be done. You see, no law affects it, for it breaks down the law. Magnetism cannot attract or repel it because magnetic fields cannot exist; there is no law of magnetic force, where this field is.

"And you know, Devin, how I have analyzed and duplicated their magnetic ball-fields. This should be capable of formation into a ball-field.

"We need only make it up now. We will install it in the 'S Doradus' and the 'Cepheid' as a weapon. We need only install it as an energy source here. Let us start."

CHAPTER XII

BUCK KENDALL with a slow smile, looked out of the port in the thick metal wall. The magnetic shield of the Lunar Fort was washed constantly with the fires of exploding magnetic bombs. The smile spread broader. "My friends," he said softly, "you can pull from now till doomsday as far as I'm concerned, and you won't even disturb us now." He looked back over his shoulder into the power room. A hunched bulk, beautifully designed and carefully finished, the apparatus that created 'Uncertainty of the Fourth Degree' was destroying matter, and creating by its destruction terrific electric fields. These fields were feeding the magnetic shield now. Under the present drain, the machine was not noticeably working. In fact, Kendall was a bit annoyed. He had tested out the energy generating properties of this machine, trying to find a limit. He had found there was no limit. The great copper conduc-

tors, charged with the same atostor force that was used in the mercury fuel, were perfect conductors, they had not heated. But the eleven thousand tons of discharged mercury metal had been completely charged in just a bit better than eleven minutes. The pumps wouldn't force it through the charging apparatus any faster than that.

Two weeks more had passed, while the "S Doradus" and the "Cepheid" were fitted out with the new apparatus Buck had designed. They were almost ready to start now.

McLaurin came down the corridor, and stopped near Kendall. He too smiled at the Miran's attempts. "They've got a long way to go, Buck."

"They're going a long way. Clear back home—and we'll be right along. I don't think they can outdistance us."

"I still don't see why you couldn't use one of those Uncertainty conditions—the First Degree perhaps, and annihilate our inertia."

"You can't control Uncertainty. By its essential character it's beyond control."

"What's that Fourth Degree machine of yours—the material energy—if it isn't controlled and utilized Uncertainty?"

"It's utter and utterly uncontrolled Uncertainty. The matter within that field breaks down to absolutely nothing. Within, no law whatsoever applies, but fortunately, outside the old laws of physics apply—and we can gather and use the energy which is released outside, though nothing can be done inside. Why, think man, if I could control that Uncertainty, I could do anything at all, absolutely anything. It would be a world as unreasonable as a bad dream. Think how

unreasonable those manifestations we first got were!"

"But can't you get any control at all?"

"Very little. Anyway, if I could get inertialess conditions at will, I'd be afraid of them. They'd make chemical reactions impossible in all probability—and life is chemical. Two atoms must come into more or less violent contact before a union takes place, and cannot if they have neither momentum nor inertia."

"Anyway—why worry. I can't do it, because I can't control this thing. And we have the extra-space drive."

"How does that darned thing work? Can't you drop the math. and tell me about it?"

Kendall smiled. "Not too readily. Remember first, as to the driving system, that it works on the fabric of space. Space is, in the physical sense, a fabric woven of the threads of lines of force from every body in the universe, made up of fields and forces. It is elastic, and can transmit strains. But anything that can transmit strains, can be strained against. With the tremendous field intensities available by the material engines, I can get such fields as will 'dig their toes' into space and push.

"That's the drive itself. It is accelerationless, because it enfolds us, and acts equally on every atom of us. By maintaining in addition a slight artificial gravity—thanks also to the intensity of those material engine fields—we can be comfortable, while we accelerate at tremendous rates."

"That is, I think, at least allied to the Stranger's system. For the high speed drive, I do in fact use the Uncertainty. I can control it in a certain sense by determining its powers, and the limits of uncertainty, whether First, Second, Third or Fourth De-

gree. It advances in jumps—but on a finer plotting of the curve, you can see that each jump represents a vast series of smaller jumps. That is there is Class A, B, C, D, and so forth Uncertainty of the First Degree. Now Class A First Degree Uncertainty involves only the deepest, broadest principles. Only they break down. One of these is the law of the speed of light.

"I'm sure that isn't the system the Strangers use, but I'm also sure there's no limit to the speed we can get."

"Doesn't that wreck your drive system?"

"No, because gravity and the fields I use in driving are First Degree Uncertainties of the higher classes.

"But at any rate, it will work. And—I suspect you came to say you were ready to go."

"I did," nodded McLaurin.

"Still stick to your original plan?"

McLaurin nodded. "I think it's best. You follow those fellows back to their system in the 'S Doradus' and I'll stay here in the 'Cepheid' to protect the system. They may need some time to get out of the place here. And remember, we ought to be as decent as they were. They didn't bother the transports leaving Jupiter when they came in, only attacked the warships. We're bound to do the same, but we'll have to keep a watch on them none the less. So you go on ahead."

They started down the corridor, and came presently to the huge locks where the "S Doradus" and the "Cepheid" were berthed. The super-ships lay cold and grey now, men swarming in and out with last-minute supplies. Air, water, spare parts, bedding and personal equipment. Douglass, Cole, and most of the laboratory staff would go with Kendall when he

followed the Strangers home. Devin and a few of the most advanced physicists would stay with McLaurin in case of need.

AN hour later the "S Doradus" rose gently, soundlessly from her berth, and floated out of the opened lock-door. The "Cepheid" followed her in five seconds. Still under the great screen of the fort, the lashing, corruscating colors of the magnetic bombs and the magnetic screen flashed and was iridescent. The "S Doradus" poked her great nose gently through the screen, and an instant later her titanically powerful, material-engine effortlessly discharged a great magnetic bomb, sent with the combined power of five atomic powered interstellar ships. The two ships separated now, the "Cepheid" under McLaurin flashing ahead with sudden, terrific acceleration toward Mars, whispering through space at a speed that made it undetectable, faster than light. The "S Doradus" journeyed out leisurely toward the fleet of forty-seven Miran ships.

Gresth Gkae saw the "S Doradus" and as he watched the steady progress, felt sudden fear at his heart. The ship seemed so certain—

At a distance of thirty thousand miles, Kendall stopped. Magnetic bombs were washing his screen continuously now, seeking to exhaust the ship as all the great ships beyond poured their energy against it. A slow smile spread over Kendall's mouth as he heard the gentle hum of the barely working material engine. Carefully he aligned the nose UV beam of the "S Doradus" on the nearest of the Miran ships. Then he depressed a switch.

There was no ion-release before the

force-mirror now. Just a jet of gas whirling into a half-inch field of 'Uncertainty of the Fourth Degree.' The matter vanished instantly in released energy so stupendous that the greatest previous UV beams had been harmless things by comparison. Material energy maintained the mirror forces. Material energy gave the power that was released. And only material energy could have stood up before it. Thirty thousand miles away, a Miran ship flamed instantaneously into inconceivable incandescence, vanishing almost in blue-violet light of terrific intensity. The ship reeled away, a half-molten wreck.

The beam spotted two more ships before it winked out. Then Kendall began sending bombs. He moved up to within 2000 miles that his aim might be accurate. They were bombs of 'Uncertainty of the Third Degree,' the Uncertainty of atomic law in bomb form. One hit the nose of the nearest ship, and a sphere five feet in diameter glowed mistily blue for a moment. Then very easily, the matter that formed the wall of the cruiser began to run and change, and presently there was only a hole, and an expanding cloud of gas. Three more flowed toward it—and the hole enlarged, and another hole appeared in a bulkhead behind.

Kendall made a change. For the first time there came the staccato bark of the material engine under strain, as it fashioned the terrific fields of 'Uncertainty of the Ultimate Degree.' Abruptly they leapt out, invisible till they entered a magnetic screen, then run over with opalescent light as the energy of the field was sucked into them and released.

It struck the nose of a ship—a field no larger than an apple—

A titanic gout of energy burst out that was soundless in space. The ship suddenly opened back, opened like the peel of a banana, till a little nub remained at the further end, and the metal flaps dropped back across and behind it dejectedly. A second ship was struck, and it was struck on one side, so that it was shattered like a spent firecracker.

Then the Miran fleet vanished in speed.

Kendall followed them. "I think," he said with a grin, "they tried to use their radio beam, but it spread too much to do anything at that distance. And they used their rotating magnetic field, which we couldn't feel. And their crumbler ray too, of course. I wonder—are they headed only for Jupiter? No—no, they've passed him!"

Faster than light, faster than energy could follow through space, or Uncertainty Bombs pursue, the Mirans were fleeing for home. They knew now that only in speed lay safety. Already they knew that a similar ship had appeared off Jupiter, and, after wiping out the Phobos and Mars stations with one bomb each, had cleared the Jovian Satellites with equal terrible efficiency.

In one of the fleeing ships was a broken, tired old man, and his staff. Gresth Gkæ looked back at the blank, distorted space behind them, at the swiftly dwindling sun, and spoke. "I was at fault, my friends. Jarth has spoken. *They* are the stronger and the wiser race. Farth Skalt has shown you—they use space fields of intensity 100. That means the energy of the ultimate destruction. Jarth used us as his instrument of testing, only to drive and stimulate that race. I do not—nay. There is no doubt now, for look."

Plainly visible, rapidly overtaking them, the "S Doradus" appeared sharp, and luminous on the jet of distorted space.

"We cannot escape, my friends. Shall we return to Sthor or remain in space, lost?"

"Let us deflect our course—at least he may not know our destination." The interstellar ship turned very slightly in her course. Plainly, they saw the "S Doradus" flash on, in a straight line, headed for distant, red-glowing Mira. Gresth Gkæ watched, and shrugged. Silently he put the ship back on its course, at its utmost speed. Parallel with them, near to them, the "S Doradus" flashed on. Day after day, the two hurled through space faster than light. Gradually Mira brightened, and at last became a disc.

GRESTH GKÆ slowed his ships, and Kendall, watching, slowed to match his speed. Five billion miles from Sthor, they had reached normal space speeds. Viciously the Miran fleet attacked the lone ship from earth. Their rays, their bombs, their every weapon was flaming. Great interstellar ships flashed suddenly into speeds greater than that of light, seeking to ram and destroy the smaller ship. The "S Doradus" flashed into equal or greater speed, and eluded them.

Kendall had determined now, which was the leader's ship.

Gresth Gkæ watched dully as his ships attempted to destroy the single, small ship. He sighed in resignation, and turned to walk back to the chapel aboard the ship. One last prayer to Jarth—

Gresth Gkæ stopped abruptly. The great ship was lurching strangely. Men shouted sudden, frightened cries.

Am. S.

The clanking and thud of relays sounded, the shriil of alarms. Then the alarms stopped, and suddenly the whole great ship vibrated to an infinitely deep voice speaking in perfect Sthorian. The voice remarked solemnly, in great, vibrant tones, that they would certainly receive news presently from the Expeditions. It went on for some seconds to discuss the conditions as reported in the new system. Then it stopped abruptly. An electric motor just above Gresth Gkæ's head suddenly hummed into action without reason or power connection. Almost simultaneously he heard the shouts of startled men as the great lock doors began to open into space of their own accord, bulk-head doors slipped shut as the roar of escaping air echoed in the ship.

Then it was all over. Gresth Gkæ ran to the control room. The Mirans there looked up at him with drawn faces.

"The instruments—Gresth Gkæ—the instruments. The instruments read impossible things, the motors worked without reason, the fields fluctuated—the atomic engines stopped and the magnetic shield broke down and gripped part of the ship instead!" reported the bewildered pilot.

"I do not know—some strange weapon of—" began the old scientist. Something luminous and huge twisted suddenly through space toward them, a bomb of "Uncertainty of the First Degree." It wrapped the ship silently—and again strange things happened. Abruptly the ship started whirling violently, yet without centrifugal force. The heavens wheeled crazily, and turned about three axes simultaneously. There was no gyroscopic effect to hold them!

Gradually the thing died out. Then a great field seemed to catch the ship,

and hurl it away from its companions. Abruptly the pilot applied all his power to pull free. In vain.

Gresth Gkæ shook his head slowly, and raised the pilot's hands from the board. "Let them do as they will. I think they mean us no real harm, Thart Kralt. They can, we know, destroy us in an instant. Perhaps he wants us to go somewhere with him—" Gresth Gkæ smiled sadly, "and anyway, we can do nothing."

For nearly a billion miles the great ship was hurled through space at tremendous normal-space velocity. Then abruptly it was halted, without a sign of strain or hurt. The great twenty-foot UV beam on the nose of the "S Doradus" broke into glowing gentle red light. It flashed twice. There was a pause. Then it flashed four times. A long wait. Then three times, a pause and nine times. A wait. Four times, a pause, sixteen times. Then it stopped.

A slow smile of ineffable joy spread over Gresth Gkæ's face. "Jarth Be Praised. He can destroy, but does not wish to. Ah, Thart Kralt, turn your spotlight toward him, and flash it five times, then pause, and flash it twenty-five times, for he is trying to start communications with us. Jarth is wise beyond all understanding. They were the weaker race, and they are the stronger. But also they are the better, for they could destroy, and they do not, but seek only to communicate."

EPILOGUE

THE interstellar liner "Mirasol" settled gently to Sthor, having circled wide of Asthor, and from her hold a cargo of the heavy Jovian elements was discharged, while a mixed stream of Solarians

and Mirans came from her passenger quarters.

A delegation of Mirans met the new Ambassador from Sol, Commander McLaurin, and conducted him joyfully to the Central Government Group. Beside the great buildings, a battered, scarred interstellar ship lay, her rear section a mass of great patches, rudely applied, and rudely made, mere cast metal plates.

Gresth Gkæ welcomed Commander McLaurin to the Government Hall. "Your arrival today, Commander McLaurin, was most fortunate," he said in the interstellar language that had been developed, "for but yesterday Gresth Talak, my brother, arrived in his ship. Before we made that fortunate-unfortunate expedition against your system, we waited for him, and he did not come, so we knew his ship had, like others, been lost."

"He arrived only yesterday, some seventy hours ago, and explained how it had come about. He too found a solar system. But he was less fortunate than I, and while exploring this uninhabited system, far out still from the central sun, where there should have been no masses of matter, one of those rare things, a giant stony

meteor that even a magnetic shield will not stop careened into the rear of his ship. Damaged badly, barely able to move, they settled to a planet. The atmosphere was breathable, the temperature mild. But while they could navigate planetary distances, they could not return, so for nearly four and a half of your years they remained there, working, working to repair their ship.

"They have done it at last. And they have returned. And best of all, after a four-year stay there, they know all they need know about that system of eleven planets. It is compact as yours, with an ultra-light sun such as yours, and four of the planets are habitable. Together we can colonize that system! It is a system of stable heat and stable light. And it is small, yet large enough. And with the devices such as your new energy has permitted, we need never fear the stony meteors again." Gresth Gkæ smiled happily. "Still better—it is inhabited only by the lowest forms of life. It is too costly to both races when Jarth sees fit to stimulate them by throwing one against the other, despite the good things that may come later."

THE END

ON SALE IN JUNE AMAZING

OVERLOOKING by BARRY N. MALZBERG, *AS I LIB AND BREED* by J.W. SCHUTZ, *A SECOND DEATH* by MICHAEL CASSUTT, *PIPER, WHAT SONG?* by DRUSILLA NEWLON CAMPBELL, and the conclusion of JOHN BRUNNER'S greatest novel—*TOTAL ECLIPSE*.

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THE FIRST SCIENCE-FICTION STORY

By S. M. RITTER

ANTEDATING even Jules Verne was the book "The Voyage to the Other End of the World." In all probability this was the first science fiction story ever written and it appeared in manuscript form about 1540 from the pen of an unknown German writer.

In theme "The Voyage to the Other End of the World" simulated Verne's book on rapid communication, "Around the World in Eighty Days." A young noble who had been dabbling in the forbidden arts and sciences, goes the story, was threatened with excommunication by the Archbishop of Paris. The threat angered the youth and he boasted that with his new found knowledge he could travel faster than man had ever dreamed of. The Archbishop sent the church police to arrest the noble but he fled to a seaport town of France where he built a huge ship motivated by heat. In this vessel, the *Forbidden*, with three companions of like mind, he reached the New World in three weeks' time.

After numerous hair raising adventures with the natives the heroes escaped thru the use of a fire gun. This seems to have been a sort of bellows that blew forth flames in a thin but fierce stream. The return voyage took about three weeks but this time the adventurers landed in Germany. They were betrayed and carried off to Paris. There, accused of witchcraft, the four adventurers were burned at the stake.

Circulation of the manuscript once reached either six or sixteen copies but was banned by the Vatican. It came to light again in 1867 but was destroyed, accidentally or otherwise, about 1880. Hartmann's "German Literature of the Fifteenth and Sixteenth Centuries" recounts the story and the fate of the manuscript or manuscripts with considerable detail.

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A new collection of outstanding stories by leading S-F writers: GOODBYE ATLANTIS by POUL ANDERSON, SF PROFILE: ISAAC ASIMOV by SAM MOSKOWITZ, BATTLEGROUND by WILLIAM MORRISON, THE ALIEN WORLDS by BEN BOVA, NO STAR IS SAFE by P.F. COSTELLO, QUESTION OF COMFORT by LES COLLINS, and KIM by AL SEVCIK.

A Classic Reprint From

AMAZING STORIES, April, 1932

The Lost Machine

By JOHN B. HARRIS

Introduction By Sam Moskowitz

NEW approaches in science fiction are rare at any time and this was true even in the early years of the science fiction magazines. The venerable 81-year-old editor of AMAZING STORIES in 1932, T. O'Connor Sloane, Ph.D., was not too old to spot the uniqueness of The Lost Machine, a short story submitted by British author John Beynon Harris, who is far better known today as John Wyndham. In an advance announcement he blurbed: ". . . this story . . . is different in the field of scientific fiction. The human reaction to the thinking machine (of the future) has been depicted, but now we have the other side—the machine's

thoughts and reactions—or shall we say, reflexes?—to human endeavor."

This was only Harris' second story, but it was to bring about a revolution in the thinking of science fiction writers on the subject of the relationship between man and machinery. Previously in science fiction, the highly-developed machines, particularly those of the "robot" type, were underscored as potential threats to man's supremacy. This trend reached its apex in Miles J. Breuer's frightening and plausible novel Paradise and Iron (AMAZING STORIES QUARTERLY, Summer, 1930), where thousands of specialized machines, directed by

electronic brains, run every function of massive industrial complexes without any human aid.

The originality of Harris' approach was immediately obvious. His story was told from the viewpoint of an extraordinarily intelligent machine. The machine was a robot from Mars, who had lost his flesh-and-blood Martian companion in an inexplicable explosion of their space ship shortly after arrival on Earth. The hero of the story and the object of sympathy is the robot, stranded on a relatively primitive planet with no hope of return to his native world.

It was left to Eando Binder in his popular story of Adam Link, I, Robot (AMAZING STORIES), Jan., 1939), to transfer Harris' notion of a responsible, highly intelligent, reliable and loyal alien robot to a mechanical man built here on earth and thereby become the midwife at the birth of the entire modern field of robot stories.

Isaac Asimov established his early reputation by utilizing Binder's type of robot in his short stories and adding "The Laws of Robotics." Binder's concept of the mechanical man as a responsible, dependable unit together with Asimov's "Laws of

Robotics" largely superseded the Frankenstein monster notion concerning such mechanisms that had been standard previous to the publication of *The Lost Machine*.

What's in a name?

John Beynon Harris made an early reputation in American science fiction magazines. As John Beynon he scored an even greater one in Britain. But as John Wyndham he was to realize his well-known and most outstanding publication achievement through serialization of *The Day of the Triffids* in *COLLIER'S* in 1950. To crash so prominent a general-circulation magazine with a legitimate full-length science fiction novel was a feat unmatched by contemporary magazine writers until John Christopher duplicated it with *No Blade of Grass* featured in the *SATURDAY EVENING POST* during 1956.

Today, John Beynon Harris' (John Wyndham's) place as one of the leading practitioners of the art of science fiction is generally acknowledged as this veteran, still actively writing, moves towards the 30th anniversary of the day he altered the thinking of the science fiction world with his short classic, *The Lost Machine*.



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"FATHER, here, quickly," Joan's voice called down the long corridor.

Dr. Falkner, who was writing, checked himself in mid-sentence at the sound of his daughter's urgency.

"Father," she called again.

"Coming," he shouted as he hastily levered himself out of his easy chair.

"This way," he added for the benefit of his two companions.

Joan was standing at the open door of the laboratory.

"It's gone," she said.

"What do you mean?" he inquired brusquely as he brushed past her into the room. "Run away?"

"No, not that," Joan's dark curls fell forward as her head shook. "Look there."

He followed the line of her pointing finger to the corner of the room.

A pool of liquid metal was seeping into a widening circle. In the middle there rose an elongated, silvery mound which seemed to melt and run even as he looked. Speechlessly he watched the central mass flow out into the surrounding fluid, pushing the edges gradually further and further across the floor.

Then the mound was gone—nothing lay before him but a shapeless spread of glittering silver, like a miniature lake of mercury.

For some moments the doctor seemed unable to speak. At length he recovered himself sufficiently to ask hoarsely:

"That—that was it?"

Joan nodded.

"It was recognizable when I first saw it," she said.

Angrily he turned upon her.

"How did it happen? Who did it?" he demanded.

"I don't know," the girl answered, her voice trembling a little as she spoke. "As soon as I got back to the house I came here just to see that it was all right. It wasn't in the usual corner and as I looked around I caught sight of it over here—melting. I shouted for you as soon as I realized what was happening."

One of the doctor's companions stepped from the background.

"This," he inquired, "is—was the machine you were telling us about?"

There was a touch of a sneer in his voice as he put the question and indicated the quivering liquid with the toe of one shoe.

"Yes," the doctor admitted slowly. "That was it."

"And, therefore, you can offer no proof of the talk you were handing out to us?" added the other man.

"We've got film records," Joan began tentatively. "They're pretty good . . ."

The second man brushed her words aside.

"Oh, yes?" he asked sarcastically. "I've seen pictures of New York as it's going to look in a couple of hundred years, but that don't mean that anyone went there to take 'em. There's a whole lot of things that can be done with movies," he insinuated.

Joan flushed, but kept silent. The doctor paid no attention. His brief flash of anger had subsided to leave him gazing sadly at the remains before him.

"Who can have done it?" he repeated half to himself.

His daughter hesitated for a moment before she suggested:

"An accident?——I wonder," murmured the doctor.

"No—no, not quite that," she amended. "I think it was—lonely," the last word came out with a defiant rush.

There was a pause.

"Well, can you beat that?" said one of the others at last. "Lonely—a lonely machine: that's a good one. And I suppose you're trying to feed us that it committed suicide, miss? Well, it wouldn't surprise me any; nothing would, after the story your father gave us."

He turned on his heel and added to his companion:

"Come on. I guess someone'll be turnin' this place into a sanitarium soon—we'd better not be here when it happens."

With a laugh the two went out leaving father and daughter to stare helplessly at the residue of a vanished machine.

At length Joan sighed and moved away. As she raised her eyes, she became aware of a pile of paper on the corner of a bench. She did not remember how it came to be there and crossed with idle curiosity to examine it.

The doctor was aroused from his reverie by the note of excitement in her voice.

"Look here, father;" she called sharply.

"What's that?" he asked, catching sight of the wad of sheets in her hand.

As he came closer he could see that the top one was covered with strange characters.

"What on earth. . . ?" he began.

Joan's voice was curt with his stupidity.

"Don't you see?" she cried. "It's written this for us."

The doctor brightened for a moment; then the expression of gloom returned to his face.

"But how can we. . . ?"

"The thing wasn't a fool—it must have learned enough of our language to put a key in somewhere to all this weird stuff, even if it couldn't write the whole thing in English. Look, this might be it, it looks even queerer than the rest."



Illustrated
by MOREY

"A second later there came a stunning explosion . . . when I looked up the vessel was nowhere to be seen . . . only a rain of metal parts dropping to earth all about me."

Several weeks of hard work followed for Joan in her efforts to decipher the curious document, but she held on with painstaking labor until she was able to lay the complete text before her father. That evening he picked up the pile of typed sheets and read steadily, without interruption, to the end. . . .

Arrival

AS WE slowed to the end of our journey, Banuff began to show signs of excitement.

"Look," he called to me. "The third planet, at last."

I crossed to stand beside him and together we gazed upon a stranger scene than any other fourth planet eyes have ever seen.

Though we were still high above the surface, there was plenty to cause us astonishment.

In place of our own homely red vegetation, we beheld a brilliant green. The whole land seemed to be covered with it. Anywhere and everywhere it clung and thrived as though it needed no water. On the fourth planet, which the third planet men call Mars, the vegetation grows only in or around the canals, but here we could not even see any canals. The only sign of irrigation was one bright streak of water in the distance, twisting senselessly over the countryside

—a symbolic warning of the incredible world we had reached.

Here and there our attention was attracted by outcroppings of various strange rocks amid all this green. Great masses of stone which sent up plumes of black smoke.

"The internal fires must be very near the surface of this world," Banuff said, looking doubtfully at the rising vapors.

"See in how many places the smoke breaks out. I should doubt whether it has been possible for animal life to evolve on such a planet. It is possible yet that the ground may be too hot for us—or rather for me."

There was a regret in his tone. The manner in which he voiced the last sentence stirred my sympathy. There are so many disadvantages in human construction which do not occur in us machines, and I knew that he was eager to obtain first hand knowledge of the third planet.

For a long time we gazed in silent speculation at this queer, green world. At last Banuff broke the silence.

"I think we'll risk a landing there, Zat," he said, indicating a smooth, open space.

"You don't think it might be liquid," I suggested, "it looks curiously level."

"No," he replied, "I fancy it's a kind of close vegetation. Anyway, we can risk it."

A touch on the lever sent the machine sinking rapidly towards a green rectangle, so regular as to suggest the work of sentient creatures. On one of its sides lay a large stone outcrop, riddled with holes and smoking from the top like the rest, while on the other three sides, thick vegetation rose high and swayed in the wind.

"An atmosphere which can cause such commotion must be very dense," commented Banuff.

"That rock is peculiarly regular," I said, "and the smoking points are evenly spaced. Do you suppose. . . ?

The slight jar of our landing interrupted me.

"Get ready, Zat," Banuff ordered.

I was ready. I opened the inner door and stepped into the air-lock. Banuff would have to remain inside until I could find out whether it was possible for him to adjust. Men may have more power of originality than we, and they do possess a greater degree of adaptability than any other form of life, but their limitations are, nevertheless, severe. It might require a deal of ponderous apparatus to enable Banuff to withstand the conditions, but for me, a machine, adaptation was simple.

The density of the atmosphere made no difference save slightly to slow my movements. The tem-

perature, within very wide limits, had no effect upon me.

"The gravity will be stronger," Banuff had warned me, "this is a much larger planet than ours."

It had been easy to prepare for that by the addition of a fourth pair of legs.

Now, as I walked out of the air-lock, I was glad of them, the pull of the planet was immense.

After a moment or so of minor adjustment, I passed around our machine to the window where Banuff stood, and held up the instruments for him to see. As he read the air pressure meter, the gravity indicator and the gas proportion scale, he shook his head. He might slowly adapt himself partway to the conditions, but an immediate venture was out of the question.

It had been agreed between us that in such an event I should perform the exploration and specimen collecting while he examined the neighborhood from the machine.

He waved his arm as a signal and, in response, I set off at a good pace for the surrounding green and brown growths. I looked back as I reached them to see our silvery craft floating slowly up into the air.

A second later, there came a stunning explosion; a wave of sound so strong in this thick atmosphere that it almost shattered my receiving diaphragm.

The cause of the disaster must always remain a mystery: I only know that when I looked up, the vessel was nowhere to be seen—only a rain of metal parts dropping to earth all about me.

Cries of alarm came from the large stone outcrop and simultaneously human figures appeared at the lowest of its many openings.

They began to run towards the wreck, but my speed was far greater than theirs. They can have made but half the distance while I completed it. As I flashed across, I could see them falter and stop with ludicrous expressions of dismay on their faces.

"Lord, did you see that?" cried one of them.

"What the devil was it?" called another.

"Looked like a coffin on legs," somebody said. "Moving some, too."

Flight

BANUFF lay in a ring of scattered débris.

Gently I raised him on my fore-rods. A very little examination showed that it was useless to attempt any assistance: he was too badly broken. He managed to smile faintly at me and then slid into unconsciousness.

I was sorry. Though Banuff was not of my own kind, yet he was of my own world and on the

long trip I had grown to know him well. These humans are so fragile. Some little thing here or there breaks—they stop working and then, in a short time, they are decomposing. Had he been a machine, like myself, I could have mended him, replaced the broken parts and made him as good as new, but with these animal structures one is almost helpless.

I became aware, while I gazed at him, that the crowd of men and women had drawn closer and I began to suffer for the first time from what has been my most severe disability on the third planet—I could not communicate with them.

Their thoughts were understandable, for my sensitive plate was tuned to receive human mental waves, but I could not make myself understood. My language was unintelligible to them, and their minds, either from lack of development or some other cause, were unresponsive of my thought-radiations.

As they approached, huddled into a group, I made an astonishing discovery—they were afraid of me.

Men afraid of a machine.

It was incomprehensible. Why should they be afraid? Surely man and machine are natural complements: they assist one another. For a moment I thought I must have misread their minds—

it was possible that thoughts registered differently on this planet, but it was a possibility I soon dismissed.

There were only two reasons for this apprehension. The one, that they had never seen a machine or, the other, that third planet machines had pursued a line of development inimical to them.

I turned to show Banuff lying inert on my fore-rods. Then, slowly, so as not to alarm them, I approached. I laid him down softly on the ground near by and retired a short distance. Experience has taught me that men like their own broken forms to be dealt with by their own kind. Some stepped forward to examine him, the rest held their ground, their eyes fixed upon me.

Banuff's dark coloring appeared to excite them not a little. Their own skins were pallid from lack of ultra-violet rays in their dense atmosphere.

"Dead?" asked one.

"Quite dead," another one nodded. "Curious looking fellow," he continued. "Can't place him ethnologically at all. Just look at the frontal formation of the skull—very odd. And the size of his ears, too, huge: the whole head is abnormally large."

"Never mind him now," one of the group broke in, "he'll keep. That's the thing that puzzles me," he went on, looking in my

direction. "What the devil do you suppose it is?"

They all turned wondering faces towards me. I stood motionless and waited while they summed me up.

"About six feet long," ran the thought of one of them. "Two feet broad and two deep. White metal, might be—(his thought conveyed nothing to me). Four legs to a side, fixed about half-way up—joined rather like a crab's, so are the arm-like things in front: but all metal. Wonder what the array of instruments and lenses on this end are? Anyhow, whatever kind of power it uses, it seems to have run down now. . . ."

Hesitatingly he began to advance.

I tried a word of encouragement.

The whole group froze rigid.

"Did you hear that?" somebody whispered. "It—it spoke."

"Loud speaker," replied the one who had been making an inventory of me. Suddenly his expression brightened.

"I've got it," he cried. "Remote control—a telephony and television machine worked by remote control."

So these people did know something of machinery, after all. He was far wrong in his guess, but in my relief I took a step forward.

An explosion roared: some-

thing thudded on my body case and whirred away. I saw that one of the men was pointing a hollow rod at me and I knew that he was about to make another explosion.

The first had done no injury but another might crack one of my lenses.

I turned and made top speed for the high, green, vegetation. Two or three more bursts roared behind, but nothing touched me. The weapon was very primitive and grossly inaccurate.

Disappointment

FOR a day and a night I continued on among the hard stemmed growths.

For the first time since my making, I was completely out of touch with human control, and my existence seemed meaningless. The humans have a curious force they call ambition. It drives them, and, through them, it drives us. This force which keeps them active, we lack. Perhaps, in time, we machines will acquire it. Something of the kind—self-preservation which is allied to it—must have made me leave the man with the explosive tube and taken me into the strange country. But it was not enough to give me an objective. I seemed to go on because—well, because my machinery was constructed to go on.

On the way I made some odd discoveries.

Every now and then my path would be crossed by a band of hard matter, serving no useful purpose which I could then understand. Once, too, I found two unending rods of iron fixed horizontally to the ground and stretching away into the distance on either side. At first I thought they might be a method of guarding the land beyond, but they presented no obstacle.

Also, I found that the frequent outcroppings of stone were not natural, but laboriously constructed. Obviously this primitive race, with insufficient caves to hold its growing numbers, had been driven to construct artificial caves. The puzzling smoke arose from their method of heating these dwellings with naked fire—so wasteful a system of generating heat that no flame has been seen on the fourth planet, save in an accident, for thousands of years.

It was during the second day that I saw my first machine on this planet.

It stood at the side of one of the hard strips of land which had caused me so much wonder. The glitter of light upon its bright parts caught my lenses as I came through the bushes. My delight knew no bounds—at last I had found a being of my own kind. In my excitement I gave a

call to attract its attention.

There was a flurry of movement round the far side and a human figure raised its head to look at me.

I was able to tell that she was a woman despite the strange coverings that the third planet humans put upon themselves. She stared at me, her eyes widening in surprise while I could feel the shock in her mind. A spanner dropped from her hand and then, in a flash, she was into the machine, slamming the door behind her. There came a frantic whirring as she pressed a knob, but it produced no other result.

Slowly I continued to advance and as I came, the agitation in her mind increased. I had no wish to alarm her—it would have been more peaceful had her thought waves ceased to bombard me—but I was determined to know this machine.

As I drew clear of the bushes, I obtained a full view of the thing for the first time and disappointment hit me like a blow. The thing had wheels. Not just necessary parts of its internal arrangements, but wheels actually in contact with the ground. In a flash the explanation of all these hard streaks came to me. Unbelievable though it may seem, this thing could only follow a track specially built for it.

Later I found that this was more or less true of all third

planet land machines, but my first discouragement was painful. The primitive barbarity of the thing saddened me more than any discovery yet made.

Forlornly, and with little hope, I spoke to it.

There was no answer.

It stood there dumbly inert upon its foolish wheels as though it were a part of the ground itself.

Walking closer, I began to examine with growing disgust its crude internal arrangements. Incredibly, I found that its only means of propulsion was by a series of jerks from frequent explosions. Moreover, it was so ludicrously unorganized that both driving engine and brakes could be applied at the same time.

Sadly, as I gazed at the ponderous parts within, I began to feel that I was indeed alone. Until this encounter, my hope of discovering an intelligent machine had not really died. But now I knew that such a thing could not exist in the same world with this monster.

One of my fore-rods brushed against a part of it with a rasping sound and there came a startled cry of alarm from within. I looked up to the glass front where the woman's face peered affrightedly. Her mind was in such a state of confusion that it was difficult to know her wants clearly.

She hoped that I would go away—no, she wished the car would start and carry her away—she wondered whether I were an animal, whether I even really existed. In a jumble of emotions she was afraid and at the same time was angry with herself for being afraid. At last I managed to grasp that the machine was unable to run. I turned to find the trouble.

As I labored with the thing's horrible vitals, it became clear to me why men, such as I had met, showed fear of me. No wonder they feared machines when their own mechanisms were as inefficient and futile as this. What reliance or trust could they place in a machine so erratic—so helpless that it could not even temporarily repair itself? It was not under its own control and only partially under theirs. Third planet men's attitude became understandable—commendable—if all their machines were as uncertain as this.

The alarm in the woman's mind yielded to amazement as she leaned forward and watched me work. She seemed to think me unreal, a kind of hallucination:

"I must be dreaming," she told herself. "It's impossible; some kind of horrid nightmare. . . ."

There came a flash of panic at the thought of madness, but her mind soon rebalanced.

"I just don't understand it," she said firmly and then, as though that settled it, proceeded to wait with a growing calm.

At last I had finished. As I wiped the thing's coarse, but necessary oil from my fore-rods, I signalled her to push again on the black knob. The whirr this time was succeeded by a roar—never would I have believed that a machine could be so inefficient.

Through the pandemonium I received an impression of gratitude on my thought plate. Mingling traces of nervousness remained, but first stood gratitude.

Then she was gone. Down the hard strip I watched the disgusting machine dwindle away to a speck.

Then I turned back to the bushes and went slowly on my way. Sadly I thought of the far away, red fourth planet and knew that my fate was sealed. I could not build a means of return. I was lost—the only one of my kind upon this primitive world.

The Beasts

THEY came upon me as I crossed one of the smooth, green spaces so frequent on this world.

My thought-cells were puzzling over my condition. On the fourth planet I had felt interest

or disinterest, inclination or the lack of it, but little more. Now I had discovered reactions in myself which, had they lain in a human being, I should have called emotions. I was, for instance, lonely: I wanted the company of my own kind. Moreover, I had begun to experience excitement or, more particularly, apathy.

An apathetic machine!

I was considering whether this state was a development from the instinct of self preservation, or whether it might not be due to the action of surrounding matter on my chemical cells, when I heard them coming.

First there was a drumming in my diaphragm, swelling gradually to a thunderous beat which shook the ground. Then I turned to see them charging down upon me.

Enormous beasts, extinct on my planet a million years, covered with hair and bearing spikes on their heads. Four-footed survivals of savagery battering across the land in unreasoning ferocity.

Only one course was possible since my escape was cut off by the windings of one of the imbecile-built canals. I folded my legs beneath me, crossed my fore-rods protectingly over my lenses and diaphragms, and waited.

They slowed as they drew close. Suspiciously they came up

to me and snuffed around. One of them gave a rap to my side with his spiked head, another pawed my case with a hooved foot. I let them continue: they did not seem to offer any immediate danger. Such primitive animals, I thought, would be incapable of sustaining interest and soon move off elsewhere.

But they did not. Snuffing and rooting continued all around me. At last I determined to try an experimental waving of my fore-rods. The result was alarming. They plunged and milled around, made strange bellowing noises and stamped their hooves, but they did not go away. Neither did they attack, though they snorted and pawed the more energetically.

In the distance I heard a man's voice; his thought reached me faintly.

"What the 'ell's worritin' them dam cattle, Bill?" he called.

"Dunno," came the reply of another. "Let's go an' 'ave a look."

The beasts gave way at the approach of the man and I could hear some of them thudding slowly away, though I did not, as yet, care to risk uncovering my lenses.

The men's voices drew quite near.

"Strewth," said the first, "ow did that get 'ere, Bill?"

"Search me," answered the

other. "Wasn't 'ere 'arf an hour ago—that I'll swear. What is it, any'ow?"

"Anged if I know. "Ere, give us a 'and and we'll turn it over."

At this moment it seemed wise to make a movement; my balancers might be slow in adjusting to an inverted position.

There was a gasp, then:

"Bill," came an agitated whisper "did you see that rod there at the end? It moved, blessed if it didn't."

"Go on," scoffed the other. "Ow could a thing like that move? You'll be sayin' next that it . . ."

I unfolded my legs and turned to face them.

For a moment both stood rooted, horror on their faces, then, with one accord, they turned and fled towards a group of their buildings in the distance. I followed them slowly: it seemed as good a direction as any other.

The buildings, not all of stone, were arranged so as almost to enclose a square. As the men disappeared through an opening in one side, I could hear their voices raised in warning and others demanding the reason for their excitement. I turned the corner in time to face a gagging group of ten or twelve. Abruptly it broke as they ran to dark openings in search of safety. All, save one.

I halted and looked at this re-

maining one. He stared back, swaying a little as he stood, his eyes blinking in a vague uncertainty.

"What is it?" he exclaimed at last with a strange explosiveness, but as though talking to himself.

He was a sorely puzzled man. I found his mental processes difficult to follow. They were jumbled and erratic, hopping from this mind picture to that in uncontrolled jerks. But he was unafraid of me and I was glad of it. The first third planet man I had met who was not terror-ridden. Nevertheless, he seemed to doubt my reality.

"You fellowsh shee the shame s'I do?" he called deafeningly.

Muffled voices all around assured him that this was so.

"Thash all right, then," he observed with relief, and took a step forward.

I advanced slowly not to alarm him and we met in the middle of the yard. Laying a rough hand on my body-case he seemed to steady himself, then he patted me once or twice.

"Goo' ol' dog," he observed seriously. "Goo' ol' feller. Come 'long, then."

Looking over his shoulder to see that I followed and making strange whistling noises the while, he led the way to a building made of the hard, brown vegetable matter. At openings all about us scared faces watched

our progress with incredulous amazement.

He opened the door and waved an uncertain hand in the direction of a pile of dried stalks which lay within.

"Gòò' ol' dog," he repeated. "Lie down. There'sh a goo' dog."

In spite of the fact that I, a machine, was being mistaken for a primitive animal, I obeyed the suggestion—after all, he, at least, was not afraid.

He had a little difficulty with the door fastening as he went out.

The Circus

THERE followed one of those dark periods of quiet. The animal origin of human beings puts them under the disability of requiring frequent periods of recuperation and, since they cannot use the infra-red rays for sight, as we do, their rests take place at times when they are unable to see.

With the return of sunlight came a commotion outside the door. Expostulations were being levelled at one named Tom—he who had led me here the previous day.

"You ain't really goin' to let it out?" one voice was asking nervously.

"'Course I am. Why not?" Tom replied.

"The thing don't look right to

me. I wouldn't touch it," said another.

"Scared, that's what you are," Tom suggested.

"P'raps I am—and p'raps you'd 've been scared last night if you 'adn't been so far gone."

"Well, it didn't do nothin' to me when I'd had a few," argued Tom, "so why should it now?"

His words were confident enough, but I could feel a trepidation in his mind.

"It's your own funeral," said the other. "Don't say afterwards that I didn't warn you."

I could hear the rest of them retire to what they considered a safe distance. Tom approached, making a show of courage with his words.

"Of course I'm goin' to let it out. What's more, I'm takin' it to a place I know of—it ought to be worth a bit."

"You'll never. . . ."

"Oh, won't I?"

He rattled open the door and addressed me in a fierce voice which masked a threatening panic.

"Come on," he ordered, "out of it."

He almost turned to run as he saw me rise, but managed to master the impulse with an effort. Outwardly calm, he led the way to one of those machines which use the hard tracks, opened a rear door and pointed inside.

"In you get," he said.

I doubt if ever a man was more relieved and surprised than he, when I did so.

With a grain of triumph he turned around, gave a mocking sweep with his cap to the rest, and climbed into the front seat.

My last sight as we roared away was of a crowd of open mouthed men.

The sun was high when we reached our destination. The limitations of the machine were such that we had been delayed more than once to replenish fuel and water before we stopped, at last, in front of large gates set in a wooden fence.

Over the top could be seen the upper parts of pieces of white cloth tightly stretched over poles and decorated by further pieces of colored cloth flapping in the wind. I had by this time given up the attempt to guess the purposes of third planet constructions, such incredible things managed to exist on this primitive world that it was simpler to wait and find out.

From behind the fence a rhythmical braying noise persisted, then there came the sound of a man's voice shouting above the din:

"What do you want—main entrance is round the other side."

"Where's the boss?" called Tom. "I got something for him."

The doors opened for us.

"Over there in his office," said the man, jerking a thumb over his shoulder.

As we approached I could see that the third planet mania for wheels had led them even to mount the "office" thus.

Tom entered and reappeared shortly, with another man.

"There it is," he said, pointing to me, "and there ain't another like it nowhere. The only all-metal animal in the world—how'd that look on the posters?"

The other regarded me with no enthusiasm in his eyes and a deal of disbelief in his mind.

"That long box thing?" he inquired.

"Sure, 'that box thing.' Here, you," he added to me, "get out of it."

Both retreated a step as I advanced, the new man looked apprehensively at my fore-rods.

"You're sure it's safe?" he asked nervously.

"Safe?" said Tom. "Course it's safe."

To prove it he came across and patted my case.

"I'm offering you the biggest noise in the show business. It's worth ten times what I'm asking for it—I tell you, there ain't another one in the world."

"Well, I ain't heard of another," admitted the showman grudgingly. "Where'd you get it?"

"Made it," said Tom blandly. "Spare time."

The man continued to regard me with little enthusiasm.

"Can it do anything?" he asked at last.

"Can it—?" began Tom indignantly. "Here you," he added, "fetch that lump of wood."

When I brought it, the other looked a trifle less doubtful.

"What's inside it?" he demanded.

"Secrets," said Tom shortly.

"Well, it's got to stop bein' a secret before I buy it. What sort of fool do you take me for? Let's have a look at the things inwards."

"No," said Tom, sending a nervous look sideways at me. "Either you take it or leave it."

"Ho, so that's your little game, is it? I'm to be the sucker who buys the thing and then finds the kid inside, workin' it. It wouldn't surprise me to find that the police'd like to know about this."

"There ain't no kid inside," denied Tom "it's just—just secret works. That's what it is."

"I'll believe you when I see."

Tom waited a moment before he answered.

"All right," he said desperately, "we'll get the blasted lid off of it . . . Here, hey, come back you."

The last was a shout to me but I gave it no notice. It was one thing to observe the curious ways of these humans, but it was quite a different matter to let them

pry into my machinery. The clumsiness of such as Tom was capable of damaging my arrangements seriously.

"Stop it," bawled Tom, behind me.

A man in my path landed a futile blow on my body case as I swept him aside. Before me was the biggest of all the cloth covered erections.

"Here," I thought, "there will be plenty of room to hide."

I was wrong. Inside, in a circular space, stood a line of four footed animals. They were unlike the others I had met, in that they had no spikes on their heads and were of a much slenderer build, but they were just as primitive. All around, in tier upon tier of rings, sat hundreds of human beings.

Just a glimpse, I had, and then the animals saw me. They bolted in all directions and shouts of terror arose from the crowd.

I don't remember clearly what happened to me, but somewhere and somehow in the confusion which followed I found Tom in the act of starting his car. His first glance at me was one of pure alarm, then he seemed to think better of it.

"Get in," he snapped, "we've got to get clear of this somehow—and quick."

Although I could make far better speed than that preposterous machine, it seemed better to ac-

company him than to wander aimlessly.

The Crash

SADLY, that night I gazed up at the red, fourth planet.

There rolled a world which I could understand, but here, all around me, was chaos, incredible, unreasoning madness.

With me, in the machine, sat three friends of Tom's whom he had picked up at the last town, and Tom himself who was steering the contraption. I shut my plate off from their thoughts and considered the day I had spent.

Once he was assured that we were free from pursuit, Tom had said to himself:

"Well, I guess that deserves a drink."

Then he stopped on a part of the hard strip which was bordered by a row of artificial caves.

Continually, as the day wore on, he led me past gaping crowds into places where every man held a glass of colored liquid. Strange liquids they were, although men do not value water on the third planet. And each time he proudly showed me to his friends in these places, he came to believe more firmly that he had created me.

Towards sunset something seemed to go seriously wrong with his machinery. He leaned heavily upon me for support and

his voice became as uncertain as his thoughts were jumbled.

"Anybody comin' my way?" he had inquired at last and at that invitation the other three men had joined us.

The machine seemed to have become as queer as the men. In the morning it had held a straight line, but now it swayed from side to side, sometimes as though it would leave the track. Each time it just avoided the edge, all four men would break off their continuous wailing sounds to laugh senselessly and loudly.

It was while I struggled to find some meaning in all this madness that the disaster occurred.

Another machine appeared ahead. Its lights showed its approach and ours must have been as plain. Then an astounding thing happened. Instead of avoiding one another as would two intelligent machines, the two lumbering masses charged blindly together. Truly this was an insane world.

There came a rending smash. Our machine toppled over on its side. The other left the hard strip, struck one of the growths at the side of the road and burst into naked flames.

None of the four men seemed more than a little dazed. As one of them scrambled free, he pointed to the blaze.

"Thash good bonfire," he said.

"Jolly good bonfire. Wonder if anybody'sh inshide?"

They all reeled over to examine the wreck while I, forgotten, waited for the next imbecility to occur on this nightmare world.

"It'sh a girl," said Tom's voice.

One of the others nodded solemnly.

"I think you're right," he agreed with difficult dignity.

After an interval, there came the girl's voice.

"But what shall I do? I'm miles from home."

"'S'all righ'," said Tom. "Quite all righ'. You come along with me. Nishe fellow I am."

I could read the intention behind his words—so could the girl.

There was the sound of a scuffle.

"No, you don't, my beauty. No runnin' away. Dangerous for li'l girlsh—"lone in the dark."

She started to scream, but a hand quickly stifled the sound.

I caught the upsurge of terror in her mind and at that moment I knew her.

The girl whose machine I had mended—who had been grateful.

In a flash I was amongst them. Three of the men started back in alarm, but not Tom. He was contemptuous of me because I had obeyed him. He lifted a heavy boot to send it crashing at my lens. Human movement is slow: before his leg had completed

the back swing, I had caught it and whirled him away. The rest started futilely to close in on me.

I picked the girl up in my fore-rods and raced away into the darkness out of their sight.

Discouragement

AT FIRST she was bewildered and not a little frightened, though our first meeting must have shown that I intended no harm.

Gently I placed her on top of my case-work and, holding her there with my fore-rods, set off in the direction of her journey. She was hurt, blood was pouring down her right arm.

We made the best speed my eight legs could take us. I was afraid lest from lack of blood her mind might go blank and fail to direct me. At length it did. Her mental vibrations had been growing fainter and fainter until they ceased altogether. But she had been thinking ahead of us, picturing the way we should go, and I had read her mind.

At last, confronted by a closed door she had shown me, I pushed it down and held her out on my fore-rods to her father.

"Joan. . . ?" he said, and for the moment seemed unsurprised at me—the only third planet man who ever was. Not until he had dressed his daughter's wounds and roused her to consciousness

did he even look at me again.

There is little more. They have been kind, those two. They have tried to comprehend, though they cannot. He once removed a piece of my casing—I allowed him to do so, for he was intelligent—but he did not understand. I could feel him mentally trying to classify my structure among electrically operated devices—the highest form of power known to him, but still too primitive.

This whole world is too primitive. It does not even know the metal of which I am made. I am a freak . . . a curiosity outside comprehension.

These men long to know how I was built; I can read in their minds that they want to copy me. There is hope for them: some day, perhaps, they will have real machines of their own. . . . But not through my help will they build them, nothing of me shall go to making them.

. . . I know what it is to be an intelligent machine in a world of madness. . . .

The doctor looked up as he turned the last page.

"And so," he said, "it dissolved itself with my acids."

He walked slowly over to the window and gazed up to Mars, swimming serenely among a myriad stars.

"I wonder," he murmured, "I wonder."

He handed the typewritten sheets back to his daughter.

"Joan, my dear, I think it would be wisest to burn them. We have no desire to be certified."

Joan nodded.

"As you prefer, father," she agreed.

The papers curled, flared and blackened on the coals—but Joan kept a copy.

THE END

On Sale in August AMAZING — June 25th

The beginning of JACK VANCE'S new novel *THE DOMAINS OF KORPHON*, *NEW ROUTE TO THE INDIES* by ROBERT F. YOUNG, *MANHATTAN SQUARE DANCE*, by TED WHITE & CALVIN DEMMON, *SEARCHING THE RUINS*, by ROBERT THURSTON, *SCIENCE IN SF*, by GREG BENFORD, *SF: THE NATURE OF THE MEDIUM*, by BRIAN M. STAPLEFORD, plus other new features, and a cover by TODD-BODE.

The Saga of "SKYLARK" Smith

By SAM MOSKOWITZ

THE hypothesis of an expanding universe was thrust upon an incredulous scientific world in 1912 when Vesto Melvin Slipher laid the groundwork for what is today known as the Doppler-Fizeau effect. Despite this, the imagination of the science fiction world stagnated within the confines of our solar system until 1928, when Edward E. Smith's *The Skylark of Space* lifted mental horizons to the inspiring wonder of the galaxy.

Why the awakening had to await the coming of Smith we will never know. It should have occurred when Camille Flammarion, the famed French astronomer and author, popularized the theories of worlds around other stars in the 19th century. It seemed to have arrived in 1904 when Jean Delaire's heroes outraced light on their way to the far places in *Around A Distant Star*, or when, the following year, the Rev. W. S. Harris merchandised *Life in a Thousand Worlds* into a best-seller by subscription.



It is possible that because Delaire and Harris were primarily intent upon "teaching that old-time religion" the glare of their spotlight on the devil blinded men to a new approach to reverence. When *The Skylark of Space* which began as a three-part se-

rial in the August, 1938 AMAZING STORIES, reached its final installment, publisher Hugo Gernsback said: ". . . We are certain you will agree with us that it is one of the outstanding sciencefiction stories of the decade; an interplanetary story that will not be eclipsed soon. It will be referred to by all sciencefiction fans for years to come. It will be read and reread."

An 18-year-old John W. Campbell, Jr., on summer vacation preparatory to entering MIT, would haunt the newsstands relentlessly, impatient at the wait between installments. Because of the impact that story would have on him and others like him, the nomenclature of science fiction would never again be the same.

What were the elements that swayed the writers as well as readers to cradle *The Skylark of Space* as the infant messiah of cosmic literature destined to limitlessly expand the boundaries of conceptual awesomeness? It was not that it stood alone. The same month, Edmond Hamilton began a two-part novel *Crashing Suns* in WEIRD TALES on an extra-solar-system scale. Earlier that year, invasion and counter-invasion had crisscrossed the vastness between earth and the system of Sirius in J. Schlossel's *The Second Swarm* (AMAZING STORIES QUARTERLY, Spring, 1928).

Perhaps it was the description

of an atomic explosion perilously close to prophecy. Very likely it was the suspenseful presentation of scientific dilemmas solved by miracle men with bus bars and test tubes. Unquestionably the marvel of distances and places which strained comprehension, unrolled in an enthralling odyssey, contributed.

Certainly it could not have been the plot line involving cloak-and-dagger manipulations for scientific secrets or the "corny" kidnapping of Dorothy Vane-man, betrothed of almost superhuman scientist Richard Seaton, by the villainous Dr. Marc "Blackie" DuQuesne. Surely the stilted love scenes, the use of slang, colloquialisms and vernacular in the dialogue detracted more than they added.

YET, despite the foregoing superficial Victorianism in the handling of the plot, it is most likely that it was a combination of these very elements with the super-science concepts that gave *Skylark of Space* titan stature in science-fiction's hall of fame. The events described were tangibly happening to people. Some of the people were stereotypes, others superhumans, but what transpired was more than an attempt at future history, it was a story. Characters reacted to mind-staggering situations.

Nor were all the characters

cardboard. No more remarkable villain has ever been depicted in the annals of science fiction than DuQuesne. He steals the show. Physically powerful, mentally a genius, distinctly amoral, he is the ultimate pragmatist. Murder without compunction for an *end* but do not lift a finger for mere sadistic satisfaction, nor permit a promise of pleasure to distract you from your purpose.

Despite the fact that Smith had a Ph.D. after his name and his character Seaton was prone to semi-technical monologues with jarring frequency, such hard-to-accept notions as speeds many times that of light and the manipulation of matter by the power of the mind were strongly challenged in the "Discussions" department of AMAZING STORIES. These criticisms failed to alter the fact that canonization was immediately in prospect for the author.

This soon-to-be-saint of the starways, the second youngest of five children, was born to Fred J. Smith, an ex-whaler working at shipping on the Great Lakes, and Caroline Mills on May 2, 1890 in Sheboygan, Wisconsin. Both parents were of British extraction and staunch Presbyterians. They christened the boy Edward Elmer, and the same year moved to Spokane, Washington, where the father contracted carpentry and cabinet work. A poor busi-

nessman, after many lean times he settled on a homestead of 160 acres on the Pend d' Oveille River in Northern Idaho, raising baking potatoes for the dining cars of The Great Northern Railroad.

The youthful E.E. logged in the winter, swamped brush, felled trees, worked in saw mills, did stretches as a lumberjack, and floated lumber down the river. His grammar school education was in the Spokane schools and the 9th grade was attended at Priest River, five miles away, where he was regarded as an outsider by the other children and had to pugilistically pulverize every other boy in the school to achieve minimal toleration, let alone friendship.

There might have been no education beyond that had the father been less of an emotional disciplinarian. The break came at the age of 18 as a result of a near-violent disagreement over the fine points of fertilizing a field with a load of manure. E.E. stormed off to Spokane for a brief stint as a conductor on a horse-drawn street car.

There had been great closeness and affection between himself, his two brothers and two sisters. He found his older brother, Daniel, teaming up with him to haul asphalt for a street-paving job. The profits from this enterprise, together with contributions from

older sister Rachel were used to send him to prep school at the University of Idaho.

AFTER the first year, he decided he wanted to be a civil engineer. At the age of 19 he helped run a railroad line north from Belton, Montana into Canada with the object of tapping mineral deposits. Seven months in the wilderness changed his mind about civil engineering. He went to work in a mine to get enough money to reenter school. One night he awoke in his room on the fourth floor of a boarding house to find that the foot of his bed was on fire. In a single convulsive leap he was out through the window, sash and all. He broke five ribs and a leg, but the worst damage was to his wrist, which couldn't be used for a year and hurt for 10 years more. Manual labor was now out of the question.

His resourceful brother, Daniel, emerged from a poker game with \$310.50 in winnings. "You," he said, gesturing at E.E., "with your gimpy wing can't earn much. Take this money and go back to college." Not only sister Rachel, but sister Mary Elizabeth as well, sent money to help him through. Their confidence was justified. Majoring in chemical engineering, he secured a junior year scholarship for the highest scholastic rating. The

schedule called for 160 credits to graduate and he got "A" in all 160 credits.

Before graduation, he had taken a civil service examination for junior chemist in Washington, D.C., and been offered the position. He had no money, so brother Dan, who was now working as a railroad clerk, collected \$150 in five minutes from his fellow employees for the fare. There was one piece of unfinished business to take care of before he left. During his senior year, roommate Allan MacDougall had shown him several stunning pictures of a sister, Jeannie Craig MacDougall, back in Boise, Idaho. Bowled over, E.E. had started a correspondence with her. He went to Washington, D.C. via Boise, where he met Jeanne for the first time and was engaged within 10 minutes of the meeting.

On the job for the U.S. Bureau of Standards in Washington, D.C., Smith helped establish tolerances on the weight of commercially sold butter. He established standards for oysters in New England, working in a laboratory on the prow of a ship at the price of perpetual seasickness.

By the fall of 1915 he had saved enough money to marry and bring his wife to Washington, D.C. It appeared, though, that he would have to sacrifice his ambition of obtaining a doctorate to

the responsibility of supporting a family, but his fear proved groundless as Jeanne went to work as a stenographer to aid him through George Washington University where he got his Ph.D. in 1919.

Instead of settling down to support his family, however, Smith, with the war still on, volunteered for the U.S. Air Force. The army took one look at his background and put him to work teaching bakers how to use 10% other grains than wheat in bread to preserve that vital commodity during World War I.

SMITH'S writing career started at a men's smoker in 1915. It was a hot, humid night and a discussion ensued with a former classmate of his, Carl D. Garby, Ph.D., on what the temperature was in outer space. Others present contributed their own ideas on the subject. That night, Carl told his wife, Lee Hawkins Garby, about the conversation. She thought the idea was intriguing and urged Smith to write a story based on it. He was dubious because he felt a story had to have love interest and he doubted his ability to cope with that part of the plot. She suggested a collaboration in which Smith handled the science and action and the love element could be left to her.

It wasn't necessary to twist

Smith's arm too hard to get him to agree. A regular reader of ARGOSY, he was particularly fond of that magazine's science fiction. In book form, he cherished everything published of H. G. Wells, Jules Verne, H. Rider Haggard, Edgar Allan Poe and Edgar Rice Burroughs. Beyond that, he was passionately fond of poetry, consumed by an interest in philosophy, obsessed by ancient and medieval history, and fascinated by English literature.

The two worked at the novel industriously through 1915 and 1916, finishing about one-third of it. Then interest waned, and the work was put aside.

At the end of the war Smith became chief chemist for F. W. Stock & Sons, Hillsdale, Mich., a position he was to occupy until 1936. His specialty was doughnut mixes, an industry which he helped to create. Formulations of such products are so tricky as to be regarded as an art form by cereal chemists.

One evening late in 1919, bored with baby sitting while Jeannie was out to a movie, he took up the unfinished novel and continued where it had been left off. He kept Garby informed about his progress, but wrote the remainder of the story himself, *including* the love interest. The Spring of 1920 the completed story began to make the rounds of the publishers.

THE quantity of rejections was ego-shattering. The only encouragement he received in eight years of submissions was a three-page letter from Bob Davis, famed editor of ARGOSY. Davis liked the story immensely, but felt it was just too "far out" to be accepted by his readership.

Every book publisher in the country had a look at the manuscript and turned it down. Whenever a new adventure magazine appeared, Smith hopefully sent it out. Finally, one day he spotted the April, 1927 AMAZING STORIES on the newsstands. He read few pages of the first story, *The Plague of the Living Dead*, by A. Hyatt Verrill, at the newsstand, gave an exultant shout, dashed home, got the manuscript and mailed it out.

Editor T. O'Connor Sloane replied with a high enthusiasm and a low offer of \$75 for the 90,000 word novel. Smith accepted (though he had spent more than that on postage through the years) but by the time the novel appeared, AMAZING STORIES had examined its conscience and a check arrived for \$125. He split the amount with Lee Hawkins Garby and *The Skylark of Space* was published as a collaboration.

The first installment had not been on sale a full month when Sloane wrote asking for a sequel. Garby wasn't interested in participating further, so Smith

started immediately on his own. The sequel, *Skylark Three*, was in every sense a continuation of the first novel. As science fiction it was also a better novel. The story was well unified and the pace sustained. Most important, Smith displayed that whatever his weaknesses at dialogue and love interest, his ability to gripingly develop suspenseful action on a cosmic scale was surpassed only by the scope of his imagination. He was probably the only writer alive who could weave a thousand words of scientific explanation into a battle scene and not slow down the pace for an instant.

Skylark Three, upon its appearance in the Aug., Sept. and Oct., 1930 issues of AMAZING STORIES, did more than even its predecessor to change the paraphernalia of science fiction. Tremendous battles of conflicting forces with an assortment of rays for offense and force screens for defense stem from *Skylark Three*. Spaceships miles in length and a fabulous array of bizarre aliens which justified the novel's subtitle: "The tale of the galactic cruise which ushered in universal civilization," became standard as a result Science fiction writers would never again be bound to their solar system.

Smith had sold all rights to *The Skylark of Space* but he released only magazine privileges

for its sequel. AMAZING STORIES voluntarily paid him $\frac{3}{4}$'s of a cent a word for that story, which was $\frac{1}{4}$ of a cent more per word than they had paid *any* author up to that time.

The Skylark stories had been carried as far as Smith intended and he now proceeded on what he thought would be a new series. *The Spacehounds of IPC*, began in the July, 1931 issue of AMAZING STORIES before the letter column had ceased ringing the praises of *Skylark Three*. It was an exciting, driving, imaginative story depicting space battles, stupendous scientific discovery and ingeniously conceived alien intelligences, every bit as good and well-sustained as *Skylark Three*. It even predicted the ion drive for space ships decades before Herman Oberth proposed it in RADIO ELECTRONICS magazine in the early fifties. Nevertheless, letters tempered praise with protests at Smith staying within the confines of our solar system in the development of the story. Editor Sloane sided with the readers and made a point of suggesting that Smith make the setting of his next story far out in the Milky Way.

SMITH was angered at Sloane, not only for the reprimand but for unauthorized changes in the published narrative, so when Harry Bates, editor of Clayton's

ASTOUNDING STORIES dangled the carrot of 2¢ a word on acceptance for first look at his next story, he agreed. A sequel to *Spacehounds of IPC* now was impossible since the new story must be offered to a competing magazine. Instead, he wrote *Triplanetary*, a novel of the unified worlds of Earth, Mars and Venus, that are attacked by an amphibian menace from a distant star. Though much of the action appeared to do little to advance the plot, Smith's writing had improved even over *Spacehounds of IPC* and he had ventured back out into the far places. Scientifically, it introduced the notion of the "inertialess" drive to attain speeds faster than light, which, while not provable, cannot be disproved and therefore is considered the best device ever proposed to conquer the light-speed limit.

The problem here developed to be with the market. By the time Smith submitted *Triplanetary* to ASTOUNDING STORIES, that magazine had gone bi-monthly and was paying on publication instead of acceptance. An announcement that the story was forthcoming appeared in their January, 1933 issue. The cover illustration of the March 1933 number (the last under Clayton) was taken from a situation in *Triplanetary*, but the company was being disbanded so the novel was not included.

Still peeved at AMAZING STORIES, Smith decided to give WONDER STORIES a look at *Triplanetary*. To his humiliation, he not only received a rejection, but they later *bragged* about it! Now there was no alternative but to submit *Triplanetary* to AMAZING where it was accepted and published in four parts beginning with the Jan., 1934 number, but Smith's rates were ignominiously dropped to half-cent a word.

To embitter further his cup of hemlock, Smith received a letter from F. Orlin Tremaine, new editor of ASTOUNDING STORIES, which had been revived by Street & Smith Publications in the interim, offering a cent a word for *Triplanetary*. When Tremaine learned that it was already scheduled for AMAZING STORIES, he suggested a third story in the Skylark series.

All the winter of 1934 Smith worked away on *The Skylark of Valeron*. With each succeeding chapter the concepts grew so increasingly grandiose that they imaginatively shrieked. In over his head, with the story out of his control he threw in the sponge. Collecting his first draft, typed on an assorted mass of pink, blue and white sheets of paper he sent it to Tremaine with a distraught note explaining that he couldn't handle the theme, and would welcome any suggestions.

THE SAGA OF "SKYLARK" SMITH

Tremaine wrote back and said that he had only one suggestion: that Smith cash the enclosed check for \$850.

What happened then makes one of the most remarkable chapters in the annals of science fiction magazine publishing. Tremaine, a crack editorial hand, had been building a dramatic and exciting new team of authors. The Smith name was just what he needed. The full-page editorial in the June, 1934 ASTOUNDING STORIES was titled "The Skylark". "For six long years, readers of science fiction have talked about the 'Skylark' stories," he began. "They have been called the greatest science fiction ever written. There were two, you remember, both pointing toward a culminating story which never appeared. . . . *The Skylark of Valeron* starts in the August issue of ASTOUNDING STORIES!"

Not only did the editorial cover a full page, but there was another three-quarter page announcement of *Skylark of Valeron's* virtues in the same issue. The following month, he announced that a new type style would increase wordage by 25,000 so readers would get the "Skylark" in addition to everything else. He exhorted each reader to introduce one new friend to ASTOUNDING. We have kept faith with you, he told the

readers, now you keep faith with us.

They did. The circulation of ASTOUNDING STORIES leaped 10,000 with the first installment of *Skylark of Valeron* (which he ran in seven parts) and the magazine went into the black for the first time in its history. Before the novel was finished, both competitors were financially on the ropes. Within a year, the two of them were skipping issues. Eventually they had to sell out.

As much as he accomplished for himself, Tremaine accomplished even more for Smith. Great as had been Smith's reputation after *Skylark Three*, it was transcendently greater now.

Temporarily, Smith could not take advantage of the situation. Personal problems interfered with his writing. Though he was running a \$5,000,000 annual doughnut mix business, he found after years of effort there was a low ceiling on his salary. He shifted to Dawn Doughnut, Jackson, Mich., in Jan., 1936 on a salary plus share-of-the-profit arrangement. In order to get the firm out of the red, he worked 18 hours a day, 7 days a week for almost a year, even designing new machinery to implement his plans. Once the company was in the black, he detailed an 80-page outline for a

400,000 word novel, divided into four segments: *Galactic Patrol*, *The Grey Lensman*, *Second Stage Lensman* and *Children of the Lens*. He actually wrote the last chapter of *Children of the Lens* after completing the rough draft of *Galactic Patrol*. This outline he submitted to Tremaine who told him to go ahead, he would buy the entire package.

Galactic Patrol (ASTOUNDING STORIES, Sept., 1937 to Feb., 1938) shares with Olaf Stapledon's *The Star Maker* the distinction of popularizing the "community of worlds" or galactic empire backdrop in science fiction. Edmond Hamilton had presented the idea eight years earlier, but Smith and Stapledon appear to have brought its potentialities into focus.

The "Galactic Patrol" is an interstellar police force organized to combat piracy and lawlessness which is threatening the structure of galactic civilization. Behind the scenes, dimly seen, are prime movers. The Arisians, whose spores projected through the galaxy, caused life to form in their image on many worlds, manipulate events for good. The Eddoreians, creatures from another space continuum, in their lust for power are the basis of most ills. Good and evil are sharply defined and the battle is joined.

While the allegory seems ob-

vious, the device of the prime mover shows up in a slightly more sophisticated form in a number of A. E. van Vogt's novels, including *Slan*, *The Weapon Shops* and *World of A*. It is implied in references to a Second Foundation in Isaac Asimov's stories. These are but two of many authors who demonstrate that Smith has been influential on several levels, shaping not only the background but the plot structure of modern science fiction.

Kimball Kinnison was the hero of the series of novels that would become known as the "Lensman" series. The lens is a communication device worn on the wrist of a lensman, which is attuned to the personality of the wearer in such a manner that it is virtually artificially alive. If worn by anyone else it proves deadly. The lensmen are a group of men and women from many worlds, trained to a peak of mental and physical attainment so high as to mark them as the beginning of a superior race. Ultimately, through selective mating, they will achieve a point of development where they can replace the Arisians as guardians of the Galaxy.

The development and adventures of this group, through the series of four novels, are delineated in the epitome of Smith's action and idea-packed style.

The Grey Lensman is probably best of the series with *Galactic Patrol* running it a close second. When Fantasy Press decided to preserve the series in hard covers Smith rewrote *Triplanetary*, adding six chapters in the process, to make it part of the whole. Several of the new chapters, each of which is a complete story in itself, are quite as good as anything Smith ever did, but the interpolation of Arisian and Edorian influences into the body of the original *Triplanetary* reduces the effectiveness of the work.

WRITING *Triplanetary* into the series made necessary a bridge novel, *First Lensman*, to link it with *Galactic Patrol*. *The First Lensman* was published in hardcover by Fantasy Press in 1950 and has never appeared in any other form. It deals vividly with the events that required the organization of a Galactic Patrol and the training experiences of the first lensman.

It was partially due to the serialization of *The Gray Lensman* in ASTOUNDING SCIENCE-FICTION beginning October, 1939 that Edward E. Smith was invited to be guest of honor at The Second World Science Fiction Convention, held in Chicago Sept. 1 and 2, 1940. Few of his fans, listening to him deliver a speech on "What Does This Convention

Mean?" in the style of the most active and rabid science fiction fan realized that Smith was in trouble. Because of the outbreak of the war, any company selling products containing sugar and flour needed no special help, least of all help that received a percentage of the profits. Smith found himself out of a job. He tried to do some writing, but couldn't seem to concentrate. Meanwhile he lived on his savings.

Then suddenly there was a special appeal. F. Orlin Tremaine, who had left Street & Smith in 1938, was back editing a new science fiction magazine titled COMET. There were nearly a dozen competitors, most of them better financed. Tremaine was finding the going rough. Could Smith help him?

Smith readily agreed to do a series of novelettes constructed around the character Neal Cloud, a professional blaster of atomic vortices from power plants out of control. *The Vortex Blaster*, first of the series, proved too little too late. It appeared in the last, July, 1941, issue of COMET. Circumstances were not appropos for a repeat performance of the previous Tremaine-Smith success.

Practically Smith's move had been ill-advised. ASTOUNDING SCIENCE-FICTION was the leading market and John W. Campbell, its editor, was not happy about

Smith's move, particularly since Tremaine had been quoted as aiming to remove ASTOUNDING from its position of leadership among science fiction magazines. Campbell began to pay more attention to building up strong newcomers.

Two other stories in "The Vortex Blaster" series, *Storm Cloud on Deka* and *The Vortex Blaster Makes War* appeared in ASTOUNDING STORIES in 1942. The first three stories together with additional new material were combined into a book titled *The Vortex Blasters* in 1960. Two separate editions, one by Fantasy Press and one by Gnome Press, were made available. This group proved the least distinguished of Smith's stories.

UNABLE to find work immediately after Pearl Harbor, Smith applied to the army for reinstatement of his World War I commission. At 51, he was overage, but they put him to work at the Kingsbury, Ind., Ordinance Plant, working on explosives and shells. He was fired in 1944 as a result of refusal to pass shells he regarded as below standard. This phase of his life is described in complete detail in chapter 5, titled "1941" of the book version of *Triplanetary*. He finished out the last year of the war as a metallurgist for Allis Chalmers. He reentered the doughnut mix bus-

iness with J. W. Allen, Chicago, in 1945, remaining there until his retirement in 1957.

Settled in his new job at the end of World War II, Smith began work on the final novel in his series, *The Children of the Lens*. It was a thinly camouflaged secret that elements of Smith's own three children, Roderick, Verna Jean and Clarissa would be present in the physical and mental characteristics of the novel's protagonists. But in truth, "Doc" Smith was a father image to thousands of the science fiction readers and he regarded them with a benign paternalism as though they were all his "children."

Therefore, when the son of a well-to-do Boston family, Thomas P. Hadley decided to take a flyer at book publishing and asked for rights to *The Skylark of Space*, it is doubtful if Smith even bothered to ask for terms. Hadley knew absolutely nothing about book publishing or marketing, but he managed to get a seven-line notice of the book with the correct price and full address on the bottom of page 110 of the August, 1946 *Astounding Science-Fiction*. A limited edition of 1,000 copies at \$3.00 each sold out completely by mail order from that single mention!

Inundated with orders, Hadley didn't even begin to know how to go about handling them. In des-

peration, he appealed to Lloyd Arthur Eshbach, former science fiction author who had some familiarity with publishing procedures. Eshbach bailed him out and the book went into an elaborate illustrated second printing which sold for almost as much per copy as it cost to print. Years later the book would see still a third printing under the auspices of F.F.F. Publishers, Brooklyn, but in the meantime Eshbach threw up his hands at Hadley's economics and withdrew.

Borrowing Hadley's list of *Skylark of Space* purchasers, Eshbach formed his own publishing company, Fantasy Press, leading off with Smith's *Spacehounds of IPC* and eventually printing 10 of Smith's novels among other titles. So popular were the Smith books that at one juncture Fantasy Press took the six volumes in the Lensman series, titled them *The History of Civilization*, bound them in uniform half morocco, boxed them and sold the sets for \$30.

THE spate of book publishing firms, specializing exclusively in fantasy, that sprang up after World War II may be attributed in no small measure to the success of the Smith titles. Scores of pulp magazine classics were sanctified by hardcovers under the imprint of such firms as

Shasta publishers, The Fantasy Publishing Co., Inc., Gnome Press, Prime Press, The Avalon Co. and New Era Publishers. Most of the fledgling publishers perished when the big trade publishers began to seriously add science fiction to their lists in the early 1950's.

The personal excitement accompanying revision of novels for book publication plus the implied prestige of hard covers, distracted Smith's attention from the fact that *Children of the Lens*, which opened in the Nov., 1947 ASTOUNDING SCIENCE-FICTION was being touted with something less than the customary fanfare. It was the first Smith novel that rated less than two covers in that magazine.

The novel failed to score any special impact. It didn't matter. Smith was too busy working on his books to notice. When Fantasy Press, virtually with its dying gasp, passed *The Vortex Blaster* like a literary baton on to Gnome Press to be distributed under that imprint, all of Smith's magazine serials but one, *The Galaxy Primes* had found their way between boards.

While Smith's books, since 1946, had sold comfortably well, they had been reviewed with a great deal of condescension as period pieces. This bothered Smith, who now was determined to prove that he could emulate

the current vogue with great finesse. Campbell at ASTOUNDING was then partial to stories with a strong element of what he termed psi phenomenon; stories of teleporation, telekinisis, telepathy, levitation and extra-sensory perception. Smith built *The Galaxy Primes* around those elements with a dash of naughtiness and considerable "way out" dialogue to prove he was no back number. It didn't set well with Campbell but it was accepted and serialized by AMAZING STORIES in 1959. Smith leaned back and waited for the reaction. It proved considerably less than enthusiastic.

Popularity frequently carries obligations. A fan named E. Everett Evans had been among Smith's most ardent boosters. In his fifties Evans determined to become a writer and succeeded. Among his published works were two very Smithlike novels aimed at teenagers: *Man of Many Minds* (1953) and *Alien Minds* (1955) both published by Fantasy Press. Evans died of a heart condition with only the first draft of another novel, *Masters of Space* completed. To help Evan's widow sell it, Smith did a complete revision and polishing job and the story ran as a collaboration in IF (Nov., 1961-Jan., 1962). Dealing with the pooling of minds telepathically as a means of invading and destroy-

ing a planet, the story failed to come off. An experimental detective novel written by Smith interested no one.

A REAPPROACHMENT with Campbell resulted in the plotting of a new series, of which *Subspace Survivor*, a novelette which appeared in the July, 1960 *ANALOG* was a prelude. The major story and sequel, *Subspace Explorers*, was another attempt on the part of Smith to write what he felt was wanted. Campbell didn't agree with him on the result and the effort ended up scheduled as an original book by Canaveral Press, publishers of Edgar Rice Burroughs hard-cover editions.

It was time for Smith to make an agonizing reappraisal. Here he was 73, retired and living in a trailer in Florida. What was he trying to prove?

The Skylark of Space in 1928 had given the science fiction world the stars. *Galactic Patrol* in 1937 had unified those stars into a community.

In each case he had dared to be himself. The result altered the direction of a literature.

What he had been doing the past few years was attempting to conform to a literary vogue instituted by someone else and in the process imitating writing methods popularized by someone else, rewriting a story conceived by someone else and patterning a plot to suit someone-else.

At the 21st World Science Fiction Convention in Washington, D.C. (birthplace of *The Skylark of Space* nearly a half-century earlier), Sept. 1, 1963, First Fandom presented its "Hall-of-Fame Award" to Edward E. Smith for his pivotal contributions to science fiction. From the floor John W. Campbell honored him with the statement: "Smith made the last big breakthrough in science fiction, we're still waiting for someone else to make another."

Almost too overcome with emotion to speak, Smith accepted the award. Inevitably, someone asked the question: "What's your next story, Doc?"

Smith's hand trembled slightly, but the answer was sharp and clear. "The title of my next story," he said, "is *Skylark Duquesne!*"

THE END

ON SALE SOON
A BRAND NEW CONAN NOVELET,
SHADOW IN THE SKULL.



Brad Nelson had a perfect way to kill Big Tim without any danger of being accused. Then his foot slipped and he was hurled into an unknown world

by CHESTER S. GEIER

I'VE got to kill you, Big Tim. I've just got to kill you! I want Laura—and you're standing in my way. . . ."

The thought beat urgently and continuously in Brad Nelson's mind. He was absorbed in it to the extent that the terrible Titanian gale which roared beyond the shelter of his thermalloy suit was forgotten.

Beside him, the object of his deadly thoughts strode unknowing. His large,

brown face crinkled in a grin of boyish enjoyment, Tim Austin was fighting his way through the fierce drive of wind and snow. That grin was always there. It was as much a part of him as his thick, tow hair, his gentle brown eyes and giant's frame. He was big and carefree, and life ran rich and full in his veins.

On Brad Nelson's face there was no enjoyment in the battle against the storm. There was not even his usual

The SPHERE of SLEEP



resentment of the bitter cold and the thick, white snow. His grey eyes were covered with a heavy film of thought. He walked in a world where there was no storm save that of his emotions, no reality outside of the imagery constructed by his brain. His stocky, powerful form plodded along mechanically.

They moved in a world of snow and ice and screaming wind. Great pinnacles and ridges, worn into fantastic shapes by the gale, towered on every side. The curtain of snow occasionally lifted to reveal white hills marching upon white hills, huge, glittering ice sheets, yawning chasms. And sometimes, farther in the distance, there would be awesome alien vistas.

The dark thread of Brad Nellon's thoughts was broken abruptly by the sudden hum of his helmet earphones. He looked up with guilty quickness. Awareness of his companion, of the frigid hell of his Titanian surroundings, rushed back in a flood.

"On the watch, guy," the voice of Big Tim Austin cautioned. "We're almost near Tower Point."

Nellon moved his head in a jerky nod of understanding. His eyes probed momentarily into those of the other, then dropped quickly back to the snow. His earphones hummed again.

"Say, Brad, anything wrong?"

Nellon's face tautened in sudden panic. Again his eyes flashed to Austin. But he did not find in them the suspicion which he expected. There was only solicitous wonder.

"I'm all right," Nellon answered. "Just a bit tired, that's all." He realized that his voice sounded hoarse and unnatural. With masked gaze, he tried to learn its effect upon Austin.

upon Big Tim. Nellon was startled by the unexpected flood of vehemence which poured in through his earphones.

"That's the result of short rations, damn it! I knew it would get us sooner or later. We should've been on our way home long ago. The whole expedition has been a mess from beginning to end.

"You shouldn't have come with me, Brad, when I volunteered to go after old Ryska's stuff. But I thought it would be all right, because we're the only real men among all those runty scientists. They're good for nothing but theory-spinning. They've thrown the expedition off schedule with their mental butterfly chasing, and got the rest of us down on short rations. And now, just as we're ready to leave at last, one of them has to remember that he left a pile of valuable equipment lying around somewhere in the snow."

Austin was silent a while. When he spoke again, the old laughter-lights were back twinkling in his eyes.

"Oh, hell, Brad. I guess I'm just sore because I'm being kept away from Laura every second the brain-gang holds us back. I can't wait to see her again."

"Yes, I know how it is," Nellon muttered.

"Swell kid, isn't she?"

"Yes." Nellon forced out the answer with difficulty.

"Well, keep your eyes peeled for Tower Point up there. As soon as we've got old Ryska's junk, we'll all be heading for home."

Nellon felt a weary sort of satisfaction. No, Big Tim didn't suspect. Big Tim didn't know that he was never going home again. Nellon had accompanied him on this final little trip to make sure of that.

They were nearing the lower end of a long ravine. Here, the invisible

BUT it was the content of his voice, not its tone which had registered

trail which they followed rose steeply and entered a narrow cleft between two huge slabs of ice. Then it dipped around the base of a great pinnacle, which thrust like an undaunted finger into the rage of the storm. This was the unique landmark which the expedition members had christened Tower Point.

Tower Point served as a great, white warning signal. For the trail skirting it gave way abruptly from powdery snow to ice of mirror slickness and slanted down sharply to a frozen lake which, unsheltered from the terrible wind, was polished constantly. One end of the lake had once been a falls, for here it ended, dropping down as sheerly as a precipice for hundreds of feet.

The way around Tower Point was one of the chief dangers, for there was no telling where the snow ended and the ice began. A sudden slip meant a swift slide down and onto the frozen surface of the lake. There, where the wind swept in all its unbroken force, one would be blown helplessly over the icy edge of the falls and dashed to death on the jagged ice teeth far below. Dick Fulsom, metallurgist, had already lost his life that way.

And that was the way Nellon had planned Big Tim Austin would die. Tower Point would mark the scene of another tragedy. Just the merest of shoves on that deadly borderline between ice and snow, and Big Tim would go flashing down to the lake and over the falls.

IT was as simple as that. Nellon knew that nothing could ever be proved against him. Nor would the faintest thought of suspicion ever enter the minds of the others. For to them he and Big Tim had always been pals in the truest, deepest sense of the word.

No, he had nothing to fear. The only reckoning would be with his conscience, but he did not allow that to trouble him now, for all he wanted to think of was Laura. Laura would be his. He knew that with a grim, satisfying certainty.

Now they were starting up the difficult rise which led to Tower Point. Nellon slipped gradually behind, until he walked in Austin's rear. His eyes settled and fixed to the metal back of the other's suit.

Very soon, now, it would be over. And then he would be on his way back home to Earth. Laura would be there on Earth, waiting. Laura.

Laura had silky chestnut hair that glinted with deep, red lights and fell in thick curls to her shoulders. Her eyes were very brown and level and filled with dancing motes of laughter. Her nose was short and pert, and he remembered the tiny mole which lay like a speck of soot just near the left nostril. Her lips were a little too wide, but they were firm and full and could quirk up in a smile that was rich and warming. Her body was small and sweet in the gentle swelling of its curves.

But it was her smile which Nellon thought of now. A bitter pain shot through him as he recalled it. Though in his thoughts it was all for him, he knew that its actual warmth was shed upon Tim Austin. Big Tim, who was so large and happy and tousled that he looked like an overgrown boy.

It was together that they had met Laura. And it was together that they had dated her. But as the three-sided friendship deepened, the inevitable change had occurred.

Strangely enough, it had been Nellon himself who brought it about. It had happened the evening he had had Laura with him alone for the first time. The spell of her charm had been concen-

trated upon him alone, and he had lost his head to such an extent that he proposed.

Laura had said no, and things had never been the same between them again. Though Big Tim may have wondered at times, he hadn't been sensitive enough to realize the change. Nellon had, in fact, concealed his pain and desire so effectively that Big Tim had never awakened to the truth.

NELLON remembered almost the exact words Laura used that evening. Even now the tones of her voice rang in his ears, gentle and sad.

"I'm sorry, Brad," she had said. "Please try to understand. I really do like you—an awful lot. You're like a rock, solid and strong, something to cling to. But Tim is like a big, clumsy playful dog—so terribly lovable. I can't help it. Really, Brad, if it wasn't for Tim, I'd never hesitate to marry you."

For two and a half years her words had drummed in his mind. "If it wasn't for Tim—"

At first he had tried to ignore the early thoughts of murder which had crept insidiously into his brain. But they persisted, grew stronger, and before long he had been making actual plans. Several times the cold hand of death had reached for Tim Austin, but each time Nellon's instincts had revolted and the thing had remained undone.

But now the members of the expedition were preparing to return home to Earth. Nellon knew that if Big Tim reached Earth alive the Laura he remembered and wanted would be lost to him forever: If Big Tim was to die, it would have to be done before the ship left, for once sealed within its confines, the risks would be too overwhelmingly large.

It had been old Sigmund Ryska who had presented Nellon with what he had realized was his final and only chance. Old Ryska had left several pieces of valuable scientific equipment lying in a small hut which he had set up for some experiments. He had remembered them at the last moment. Someone had to fetch them before leaving, and Big Tim Austin had volunteered. Nellon, because of the purpose which motivated him, had gone along.

He had made up his mind at last. This time he would allow no scruples to stay his hand. This time Big Tim would die.

THEY had reached Tower Point.

Nellon's breathing had quickened, and a fine perspiration had broken out upon his face. Fine lines were etched around his eyes and mouth.

Nellon and Austin stood side by side a moment upon the summit which was crowned by the great pinnacle of Tower Point. Down below glittered the surface of the frozen lake. White and desolate, the frozen wastes of Titan tumbled and leaped on every side. Snow swirled about them, whipped into angry life by the gale.

Austin turned.

"Well, down we go. Watch it, guy." For a second his eyes locked with Nellon's. A frown of perplexity and concern narrowed them.

"Brad—anything wrong? You don't look right, somehow."

Nellon felt himself go icy cold. Words of hoarse denial tumbled to his lips.

"No—it's nothing. I—I'm all right."

But Big Tim was not assured.

"Listen, Brad, Ryska's hut isn't much further, now. You'd better wait here, and I'll go on ahead and get the stuff. It's hard and dangerous going, and if you aren't well—"

"I tell you I'm all right!" Nellon blurted. He was hot now with a fever-

ish warmth that made the perspiration which covered his body feel clammy cold. The old fear of murder was gone. Nellon knew only a burning desire to get the thing done, a wild alarm that his opportunity would vanish before he got the chance.

Big Tim shrugged.

"Come on, then. But watch it, guy, and sing out if you need me." With a last troubled glance at Nellon, he turned to the downward sloping trail and began the descent. He moved slowly and carefully, testing each foot of the way with a ponderous, insulated boot for the sudden slickness that would announce the dangerous ice.

Nellon was swept with relief. His blood rushed through his veins in a sudden fierce singing. Now, now! The broad, metal back of Big Tim's suit spread before him. Far down below the gleaming ice waited.

Nellon took swift steps forward, his arms coming up. The rushing in his ears leaped to a high pitch. He sucked in a breath, held it. Then—

Nellon slipped. It must have been a small patch of ice undetected by Austin. But Nellon slipped, lost balance, crashed into the other. Together they went whizzing down the trail toward the frozen lake. It was a long slide, but incredibly swift, and confusion and surprise made it seem all the shorter. What happened took place too quickly for thought to follow or prevent.

THEY caromed onto the ice of the lake. With a gleeful, demoniac howl, the terrible wind swooped down upon them, swept them with increased speed toward the edge of the falls. Though still half stunned by the sudden catastrophe, they reacted with the instinct of long conditioning, tried frantically to retard their swift flight over the ice. But it was futile. Their gouging metal fin-

gers could find no purchase in the glassy smoothness over which they sped. And before friction could slow them even the merest of trifles, they were swept over the edge of the falls.

They went over, but not down upon the jagged ice teeth bared hungrily below. Nellon's attempted shove had given them both an added impetus, and they had shot over the ice at an angle which landed them upon the snow banked on the farther side of the gorge.

In that far distant day when the heat of Saturn had been great enough to cloak its satellites in warmth, the gnawing of the falls had worn steep sides in the gorge. And though the snow upon which the two men had fallen was thick and soft, it was not enough to hold them, and they went rolling end over end, in great clouds of powdery white, to stop only when they had reached the bottom.

For long moments they lay still. A thick pall of settling snow hung on the frigid air. The wind seized portions of this and sent them whirling and twisting in fantastic gyrations.

The thermalloy suits were essentially compact, mobile shelters, and had been designed more for protection against inimical extra-terrestrial elements rather than for comfort. Brad Nellon had been bruised and shaken until it seemed that his body was one throbbing ache. His senses whirled giddily in a black mist shot through with flames of pulsing red.

Of a sudden the pain leaped to intolerable heights. His battered muscles screamed an anguished protest along his nerves. Then the pain was gone, and momentarily the blackness closed in again. But something like a fresh wind sprang up, and sent the engulfing fog thinning away. Nellon's brain cleared. He opened his eyes.

He looked into Big Tim's face. Big

Tim was bending over him, worried and anxious. Nellon began to understand.

Big Tim had recovered first from the plunge. He had propped Nellon up, then turned the valve which increased the flow of oxygen inside his suit. They were alive. Nellon felt a dull wonder at it.

"Brad—all right?" It was Big Tim, his voice strained and hoarse.

Nellon nodded mechanically.

"All right."

"What happened, Brad?"

Nellon looked away. He looked up the gorge, at the tip of Tower Point. He licked his lips.

"I—I don't know. Didn't feel well—slipped on a patch of ice."

Big Tim shook his head.

"I told you to stay up there, didn't I? I knew you were in no condition to make the descent, but you were just stubborn enough to do so. It's lucky we didn't get our necks broken." He looked down and across to where, directly under the falls, the ice fangs jutted, cruel and gleaming.

NELLON was fully recovered now. He followed the direction of Austin's gaze, and though his eyes saw the same thing, his mind pictured it in a different way.

Those ice teeth should have meant Big Tim's death. He, Nellon, had failed, had narrowly escaped losing his own life because of his blunder. Intent upon the shove which was to have sent Tim Austin hurtling to his death, he had forgotten the snow-concealed ice in the trail, as lethal with hidden treachery as a patch of quick-sand.

But he was still alive. They hadn't, as yet, even reached Ryska's hut, and Nellon knew another chance would present itself. He considered this with a curious mixture of impatience and reluctance.

"If it wasn't for Big Tim—" Nellon was hearing Laura say the words again, and once again the realms of unutterable bliss he read into them strengthened his resolve. One more chance—and this time he would not fail or waver.

"Brad—look!"

Vibrant with surprise and urgency, the words ripped aside the veil of Nellon's thoughts. His head jerked up.

Big Tim was on his feet. He was pointing up at the steep bank of the gorge down which they had tumbled.

Most of the disturbed snow had settled and the wind had carried away the rest. Nellon could see quite clearly.

There up on the bank, a small snow slide had taken place. And now, against the unbroken monotony of white, something gelled in vivid contrast.

Nellon squinted. Gradually he began to make out details. The strange surface revealed by the slide seemed to have the mellow hue of bronze, but Nellon could not be sure, since it was queerly dappled and flecked with tones of gold and red. He thought it must be from the strain on his eyes, and closed them momentarily. But when he looked again the colors were as weird as he had last seen them. This time, however, he made out a detail which he had missed previously. The surface seemed to be crossed by a black line or stripe.

"Now what in the world can that be?" Tim Austin's voice was wondering, vaguely troubled. "It's like no sample of rock or soil we've taken. Metal—that's what it is!" he exclaimed of a sudden. "It's an exposed vein of some metal. Come on, Brad, let's have a look at it."

Nellon got to his feet, his eyes fixed upon that uncanny patch of something which stood out against the surrounding whiteness like a smear of blood.

Big Tim was already started up the

bank. Nellon sucked in a breath and followed after him.

THE climb was a hard and difficult one, and their recent physical jarring caused by the fall made it all the harder. But curiosity pulled them on like a vast magnet. In the exertion they forgot their aches and bruises. Slipping and sliding, clutching for handholds, floundering in loose drifts which filled pockets of hardened crust, they made their way slowly but surely up the bank.

Finally they stood before that strangely mottled patch of red and brown and gold. The mood of awed wonder which gripped them at once heightened and deepened.

"It is metal!" Tim Austin breathed. "But—but, Brad, it's not a vein. It's—"

"It's a door!" Nellon finished hoarsely.

It was a door, a metal door in the snow covered bank of a falls that had, in some long, long ago, solidified to ice. A door to what? Where did it lead? What would be on the other side of it? What could be on the other side of a metal door on a world where it was doubtful that living beings had ever existed at all?

There was a rasp in Nellon's ear-phones. And then Big Tim Austin's voice followed it.

"Brad—I'm going in. This—why, this is the biggest find of the whole expedition!"

"It might be dangerous," Nellon pointed out, before he could become aware of the wealth of irony which lay behind the words. "We don't know what sort of life—"

"But this door has been hidden under snow for the Lord only knows how many years, Brad. Look where the crust had split here. It's thick, thick. Nothing has gone in or out for a hell of

a long time. If there were beings, they're either gone or dead."

And, as if having satisfied himself on this last account, Big Tim stepped directly up to the door. He was a tall man, yet he seemed dwarfed beside it. And it was obviously very massive, for it was partly open and the width of the edge revealed could not have been spanned by the long, flexible metal fingers of their protecting gloves. The opening was a mere crack, as if someone had once made it so for a cautious glimpse of the world outside and never closed it again.

Big Tim placed his gloves against the projecting edge.

"Give me a hand, Brad. We'll see if we can open it further."

Together, they shoved. They drew upon ebbing reserves of strength, but what energy they managed to summon they threw into a brief, terrific effort to move the portal. But it did not move. Their combined strength seemed pitifully small against the weight they sought to budge.

They were about to relax their efforts in despair when, suddenly, transmitted from the metal of the door to that of their gloved hands, they felt what seemed to be a coughing whir. The sound smoothed out, deepened, and became a steady hum.

Startled, they leaped away. Their faces took on an intent, incredulous expression.

The door was opening. Slowly, majestically, it was swinging wide.

NO FORCE that they could see was behind it. The door seemed to move of its own volition. They stood as still as a pair of weird, metal statues, watching. Every sense, keyed to its highest, was directed at the widening gap.

At last all movement ceased, and the

door hung wide. The humming note which had accompanied its opening dwindled to a whisper and died away. Revealed was a tunnel of utter blackness.

Tim Austin released his breath. The sound roused Nellon from the trance which gripped him.

"It's probably controlled by an automatic mechanism. When we shoved against it, we must have set that mechanism in motion."

"I'm going in, Brad," Big Tim said suddenly. "I'm going to see what's inside." He strode impulsively to the door. But at the threshold he stopped and turned and looked at Nellon.

Nellon smiled faintly and nodded. He strode after Big Tim. Together they entered the doorway.

Lights, built into the helmets of their suits, but up to this time unused, were turned on to illuminate the way. The tunnel, they saw, was a rectangular corridor or passageway. It was lined with the same metal as that of the door.

At two intervals down the corridor they found it necessary to squeeze through half-opened doorways. The doors here were of the slide type and seemed to be controlled by machinery as was the one which they had opened to gain entrance to the corridor. But these could not be moved, nor did their efforts awaken any hum of machinery.

"You know," Big Tim remarked, "this arrangement of doors sort of reminds me of an airlock."

"I've noticed the same thing," Nellon responded. "But an airlock—" He shook his head, for this was one of the many things he couldn't understand.

Soon the corridor came to an end. Nellon and Austin found themselves in a small, square room, each side of which was lined with small glass cubicles or cabinets. In each reposed a transparent sphere with various inexplicable attach-

ments and a compactly folded mass of some strange material.

"Helmets!" Big Tim breathed. "Brad, those are helmets. And unless I'm mistaken the other stuff must be suits of some kind. What have we stumbled onto, anyway?"

Nellon passed a slow, almost-knowing glance about the room, his helmet lights glinting on the glass of the cabinets.

"I've got a crazy idea," he said. "But let that wait until we see more. There's another doorway over there. Let's go on."

THEY went on. There were more corridors, but this time there were rooms opening from them. Each was uniformly alike, filled with the same articles and furnishings. Nothing with which they were familiar had any counterpart here. Everything, from strange, rounded furniture to bizarre clothing, was weirdly alien.

But of the beings who had once inhabited these rooms they found no trace. There were only the garments they had once worn, the chairs in which they had sat. About these clung the ghosts of their presences. Over all was an air of desertion and long neglect.

They entered another section. Here there were rooms as large as halls, spread with queer tables and chairs. One they found to be a library, for on shelves they found large, tablet-like books whose stiff pages were covered with glowing heiroglyphs.

Then they found their first stairway, a succession of small ramps leading to some floor above. They ascended slowly, with the feelings of men entering some new portion of strange and utterly alien world.

Here they found but one, huge room, and this their lights revealed to be perfectly circular. In the center, glow-

ing greenly, was what appeared to be an immensely thick column, rising from floor to ceiling. About this banks of strange instruments and machinery were grouped.

"Brad," Big Tim whispered. "This place— What on earth could it have been for?"

Nellon made small, slow shakes of his head.

"That's what bothers me. I can't imagine any possible use. They knew utility, the beings who built these rooms. There was a good purpose for this room, I'm sure. Yet I can't imagine what it could have been. None of the activities which we normally carry on in life would seem to fit in with these surroundings."

"Brad—that's it! This room was for no normal use. It was for something—oh, I don't know. But it must have been something tremendously important to them. I feel—" Big Tim did not finish. His strained, low voice died away, and he moistened his lips. The reverie heavy upon his face showed clearly how oblivious he was of the act.

"Let's take a closer look at that column, or whatever it is," Nellon suggested. "We might find a clue."

THE column was big. Just how big they had never realized. It was only when halfway to it, and still approaching, that awareness of its size began to dawn upon them.

The vastness of the room had dwarfed it somewhat, but now, almost upon it and with their own sizes as standards of comparison, they were amazed and awed at its cyclopean girth. Slow understanding of the heroic dimensions of the place in its mysterious entirety began to dawn upon them.

And then Nellon became conscious of something else besides size. With

closer and closer approach to the column, a strange comfort and well-being was growing within him. The stiff soreness of his bruises was easing. The sense of restless confinement which he always associated with the wearing of his thermalloy suit was dimming. The first pangs of rising hunger of which he had earlier become aware were now dulling, as though he were in the midst of a bountiful and delicious meal. He experienced a rising tide of physical and mental satisfaction, as if every want of these two components were being realized and generously administered to.

Momentarily, he thought of Laura and, because it had grown to be synonymous with her, the murder of Big Tim. His mental picture of the girl had never been more beautiful, desirable, or appealing. Every quality which she had ever possessed, real in actuality or imaginary as a result of his idealizations, was now transcended beyond all mortal planes. She became the very embodiment of every human aspiration and desire.

Surely, he found himself reasoning with that curious pleasure and contentment which had come over him, the murder of Big Tim for so glorious and wonderful a girl could be no base act. And the scruples which had forever risen to bar him mockingly from the actual deed, were now so smoothed away that he would never have known he had had them. Big Tim would die, of course. And he would take great pleasure in killing him. There would be no regrets, no self-accusations, no torturing pangs of conscience. There would only be complete satisfaction, comfort, and happiness. And Laura would be his. There was no doubt about that. There was no doubt anywhere in his mind. There was only complete gratification of every whim-

sical and vagrant thought or desire.

Then a sudden jar shook him. For a moment he had the sensation of struggling up from warm, drowsy depths. And then, suddenly, he was looking into Big Tim Austin's puzzled and incredulous face, and that eerie mental surcease was gone.

"Brad—did you feel it, too?"

Nellon nodded wordlessly. He was a little frightened of the weird force that had held them both in thrall. A glance at the column looming gigantically before him showed that he and Big Tim had walked a good distance without any conscious knowledge of having done so. It was the chance collision which had aroused them both from their sleep-walking state.

NELLON could feel the force yet, brushing at the fringes of his mind with warm, soothing fingers. But he soon found that, with active resistance, there was no fear of it overcoming him again. One thing persisted, however, and that was the curiously refreshed and stimulated condition of his body. Nor was he anxious that this should go away.

They were within yards of the great column, now, and at an ever shortening range their eyes began to make out certain details which they had missed during their progress under that inexplicable half-trance.

It was not actually a column, they realized, for it was hollow and they could dimly make out the shapes of objects within. It was a vast, room-like cylinder or enclosure, with walls of transparent green. In the center, and midway between floor and ceiling, there hung what seemed to be a ball of vivid green fire.

Upon reaching the cylinder, they pressed closely to its hard surface and peered intently within. But at first the

great, flaming ball obscured such early details as they could discern. It was like looking upward through water at the blinding disc of the sun. Then, as their eyes grew accustomed to the emerald brilliance, they found themselves gazing at an unbelievable scene.

High above floated the fiery, green ball. Directly below it glittered the complex mass of a great machine. This was spread upon a huge base and narrowed as it rose. Circling the apex were a multitude of rod-like projections, the ends of which terminated in large crystal cones. The bases of these were pointed upward, and from each a pale, almost invisible, beam shot up and into the green ball, as though as once nourishing and supporting it.

But it was not this which held the incredulous fixity of their gaze. For arranged in concentric circles about the machine were hundreds of tables or low platforms and upon each a still figure lay. The nearest table was some distance from the wall through which Nellon and Austin peered, and this, added to the weird, green light of the globe, made a clear delineation of physical characteristics impossible. Yet they were able to make out enough to become convinced, that, as their earlier examination of the clothing in the rooms had suggested, the figures were hauntingly human.

FOR a long moment they stood there.

Then Big Tim turned, and Nellon, looking around in response to the action, was amazed at the bright and feverish gleam in the other's eyes. Words tumbled from Big Tim's lips in a hoarse rush.

"Brad, this is going to make interplanetary history. It's the biggest thing since the discovery of the first dead city on Mars. We've got to go back to the ship and bring the others. They've

got to see this. But, Brad, before they do, I'm going in there. I want to be the first to see what these people looked like. There must be a door somewhere—"

And before Nellon could voice the protest which rose to his lips, Big Tim had started away on an eager circuit of the green wall. Nellon stood looking after him in indecision, torn between conflicting impulses. Then he tightened his lips and followed in the direction which Big Tim had taken. But before Nellon could reach him, the other's excited voice crashed in his ear-phones.

"I've found it, Brad! There is a door here."

Nellon jerked into a run. He found Big Tim standing upon a short ramp before a section of the wall which was different from the rest. It was a dark area, rectangular in shape. At one side, seen dimly through the strange green substance, was an arrangement of rods and gears which was obviously an operating mechanism. Protruding from a slot in the wall, and clearly connected with the mechanism, was a short lever.

Big Tim's blue eyes glittered with daring. His tow hair awry, he looked more than ever the picture of an overgrown, impulsive boy.

"Good heavens, guy, you surely don't intend to go in there!" Nellon exclaimed. "We don't know what sort of—"

Big Tim gave a short, excited laugh. "Look—there's nothing to be afraid of. There's just that green light up there and the people, and they are dead. Everything in this place is dead. Brad, this is the chance of a lifetime. We'll be the first to look upon the faces of an extra-terrestrial race since the Martians."

Big Tim pulled the opening lever. There was a moment of appalled and

complete quiet. Then hidden motors hummed into alien life, and slowly the door before them slid aside. Undimmed now by its confining walls, the green radiance poured through the opening in a blinding flood.

"Come on," Big Tim urged. And without any hesitation on his own part, he stepped through, to be bathed instantly in the emerald glow.

NELLON moved to the open doorway. The emerald rays from the globe fell upon him with an almost sensible warmth. Again that weird peace and comfort was upon him, but more overpoweringly now. He felt a rising tide of drowsiness. In some strange way, he knew it would be good to allow himself to succumb to the softly-blanketing darkness which was filling his mind. It would be a blessed surcease from all the troubles and cares of his present world. But something held him back.

And though a great, calm voice seemed to give him every assurance of safety, a stubborn, small one screamed him its warning. In a turmoil, he watched Big Tim stride toward the nearest of the platforms.

It became evident to Nellon almost immediately that Big Tim was never going to reach his goal. For shortly after the first several steps, the blonde giant's purposeful walk slowed to a bemused shamble. And, watching with a curiously disembodied attention, Nellon saw him waver, stop; and then collapse upon the floor, as though he had suddenly become very, very tired.

The warning voice was shrieking now. Nellon felt a swift rush of terror that ripped him free of the force which enclosed him in its lulling folds. He shot a wide-eyed glance from the gleaming, inert shape of Big Tim's suit to the globe flaming high above. He

wanted suddenly to run.

He struggled in panic against the invisible bonds of peace and comfort which were so reluctant to let him go. His determination to be free was the fierce and frenzied one of utter fear. Flailing his arms as if against some material foe, he managed to stumble down from the ramp, to one side of the doorway where the green light would not reach him.

Exhausted from the herculean struggle, he slumped to the floor. A soft, warm blackness was settling over him, and he was powerless to fend it off. But he knew that he was safe, and the satisfaction which he felt was increased by the radiation which he had absorbed, so that when he finally swooped into unconsciousness, it was amidst a thunderous, victorious singing.

NELLON'S next sensations were curious ones. He seemed to awaken in another realm. It was a vast and formless place with no distinguishable feature or color, but it was curiously sentient, pulsing with awesome possibilities.

Now, as though stirred by his reflection upon it, the nebulous stuff began to writhe. And then, taking shape from the formless jumble of thoughts in his subconscious, a dream-world began to grow. Bits were added here, others discarded there, but every compartment in the storehouse of his mind contributed something. And all assembled in accordance with the pattern Nellon had fashioned in two and a half years of brooding. Finally his dream paradise was complete to the last detail of his hopes and imaginings.

It was the world which he had built around Laura taken on an immaterial, but to him nonetheless real, life. There was Laura and there was himself. And there was the complete bliss for which

he had planned Big Tim's murder to achieve.

He became aware of a change. The outlines of his world were dimming, dissolving, fading. Even Laura, radiantly lovely, was beginning to blur before his eyes.

In horror he sought to clutch the evaporating structure to him and stabilize it once again. But it slipped through his fingers like an impalpable mist. Before he was fully alive to it, his dream Eden was gone, and he was back in that formless void in which he had found himself. And even that was thinning.

Nellon awoke. He looked around for Laura and that idyllic dream land in which they had loved. But only the great, green cylinder with its flaming globe and the vast room beyond met his gaze.

Nellon climbed to his feet. With the action, he became aware that he felt wonderfully refreshed and stimulated. He looked around for Big Tim, then he remembered. Avoiding the open doorway through which the rays still poured, he peered through the green wall. Big Tim was lying there on the floor within. He was very still in his thermalloy suit.

Nellon began a chain of reasoning. As it progressed, there went with it a rising tide of exultation.

As long as Big Tim remained there under the influence of the globe, he would remain unconscious, living, perhaps, a dream as real and vivid as his own had been. It would be just as though Big Tim were dead. None of the expedition members knew of the doorway through which he and Big Tim had entered. With the almost continuous storms which raged on Titan, the door would soon become covered again. Ages might pass before a chance accident revealed it once more.

He, Nellon, could go back to the ship

with a tale of how he had lost Big Tim in the bitter storm. The men might search, but he knew it would be futile.

Laura would grieve, of course, when he returned and told her the news. But he would be there to comfort her, and she would get over it. And he knew that she would marry him, with Big Tim out of the way. He could look forward to a happiness more satisfying than that of the dream.

Nellon saw his course clear. He knew just what he had to do.

FIRST be released the lever, and the door slid shut, entombing Big Tim within the great cylinder. Then he retraced his way down to the lower level and through the maze of rooms and corridors. It was not long before the snow of Titan once more keened against his suit.

He threw his weight against the great door. Only the impulse was necessary to close it, for the operating mechanism hummed into vibrant life and it swung shut where it had not been shut before—and locked! Nor would it open again.

Even if he had wanted to re-enter, that was impossible.

Nellon started back to the ship. With the curious vigor he felt, the dangers and difficulties of the return trip hardly registered upon him at all. Gone was his sullen dislike of the ever-raging storm. He plowed through it with a careless smile, fighting his way over the wild and tumbled terrain. And it was with no feeling of exhaustion at all that he finally sighted the great, toothed ice ridge which marked the site of the camp.

As Nellon shouldered through the narrow cleft which led into the protected, tiny valley, he remembered to remove the smile of eager triumph upon his face. It would not go with the

story he was to tell.

But it was hardly necessary for him to make the effort. For at the sight that met his eyes, an involuntary grimace of appalled amazement flashed over his features.

Where the ship had rested there now was nothing at all, save a smooth surface of snow. And to his incredulously searching gaze, there was no indication that anything had ever been here. The little valley was virgin of any sign of human habitation. Only the bitter wind existed here, as always it had, keening along glittering ice surfaces, sporting with the snow,

NELLON felt the sudden nausea and weakness of a terrible fear. But a bit of flotsam presented itself out of the turbulence of his thoughts, and he clutched at it with the eagerness of despair.

He must, he told himself, have accidentally encountered a site similar to the one in which the ship had lain. He had but to find the correct ridge and everything would be all right.

Nursing this hope, he started on a tour of the vicinity. Soon he realized, however, that there was no other ridge, and he had to face the fact that he had originally been at the real site. The only difference was that the ship was gone.

But Nellon felt that he had to make certain. Returning to the valley over which the ridge rose like a sheltering wall, he searched about in the deep snow. One of the first objects he discovered was a large, metal box. On one side were stenciled words which burned into his brain:

The Harton-Finston Institute.

He knew now beyond any lingering doubt that he was in the right place and

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MONSOONS

by GERALD VANCE

THE gleaming insignia stripes on Lieutenant Ward Harrison's broad shoulders were less than two days old when he received his first assignment.

"Lieutenant Harrison," his commanding officer said, glancing from the papers he held in his hands to the young man who stood at attention before his desk, "this will be your first touch of action since you were commissioned. A lot depends on how you handle yourself."

"Yes sir," Ward answered. He straightened his already poker-straight spine. His face was young and serious and intent. There was a blaze of zeal in his blue eyes and grimness in the tightness of his jaw. But a lock of blonde hair that fell over his forehead lent an incongruously boyish cast to his grimly set features.

His commander, a Planetary Colonel, with thirty years of void experience behind him, smiled slightly and looked down at the papers in his hands again.

"Your training record has been ex-



Ward Harrison got himself into a barrel of trouble when he accepted a job at the Martian Observation Station. There were fearful "things" on Mars. . .

of DEATH



cellent, Harrison," he said, "and I am gratified to note that you apparently realize the seriousness of our work." He leaned back in his chair, looked up at the young Lieutenant. "It took science hundreds of years to lick the problem of crossing the void of space to the outer planets. Now, that that much has been accomplished, the task of exploring and possibly developing and colonizing those planets is ahead of us. The most important part of that work is up to men like you, Lieutenant Harrison. You are attached to the meteorology department with the job of doing the preliminary analysis and exploration on the various planets whose raw materials are essential to Earth. Never for a minute underestimate the importance of that work."

Ward cleared his throat. "I won't sir."

"Good. There are other branches of the service that might seem more glamorous, but all of them are dependent on your research and findings. Without meteorological survey the entire network of space stations we have established would have been impossible. And the need today for accurate and thorough research on atmospheric conditions in the Universe is greater than ever before. Always keep that in mind."

"I will, sir," Ward answered.

"Good," the colonel said. He ran a heavy hand through his silver-dusted hair and then picked up again the sheaf of papers from his desk.

"Your first assignment is to one of our established observation stations on Mars," he said.

WARD kept his face woodenly expressionless; but it was hard to conceal his disappointment. He wanted adventure and danger. He wanted to prove his courage and loyalty on some

perilous journey to an uncharted, unexplored area, and there was little hope for such action on an established base.

"The station to which you are being sent," the colonel went on, "was established three years ago by the man who is still in command there, a civilian by the name of Thomas Halliday. He is alone there, now. His assistant died about six months ago. You will act as Halliday's assistant in atmospheric experimentation and in the collection of meteorologic data. Despite the fact that he is a civilian you will take your orders from him. Is that much clear?"

"Yes," Ward said. He had to fight to keep the bitterness he was feeling from showing in his voice. He had been prepared for anything, but this was too much to accept cheerfully. Serving on a dull, one-man base, under the domination of a civilian, who had probably been rejected by the regular service for timidity or incompetence, was a bitter pill to swallow. Ward found a real, though illogical, resentment welling in him. And the object of this resentment was Thomas Halliday.

"Thomas Halliday," the colonel said, "is a very careful, painstaking meteorologist. He is completely dependable and reliable. The information he has sent us to date is accurate and thorough. Moreover he is extremely cautious." The colonel paused and frowned and his thick strong fingers drummed irritably on the top of his desk.

"Damn it!" he said with sudden explosive impatience. "Sometimes I think the man is too cautious. He's been there three years now and he still hasn't sent us a complete report on conditions there. Caution and care are fine qualities but, like all things, they can be overdone. We're planning on erecting a large special base in his locality when we finally get all the informa-

tion. But we can't make a move until Halliday comes through."

"Is there any reason why the research might have been delayed?" Ward asked.

The colonel shook his head.

"Not as far as we know. Now don't get me wrong. I'm not damning any man until I know all the facts. I'm not a pot-bellied, arm-chair admiral. I've been in the void myself long enough to realize that you can't pass judgment on a man's work until you've actually seen the situation he's up against. You can't get the complete picture from a three hundred word report. There may be other factors to consider that we here don't know about. But Halliday's data isn't coming in fast enough and I'm taking steps to get at the bottom of the trouble. I'm sending you there, Harrison, because your record indicates that you're a go-getter. Maybe what Halliday needs is a little more recklessness, a little more impulsiveness and a lot less caution. I'm hoping that you will act as a spur to Halliday. Think you're up to the job?"

Ward's eyes were flashing with excitement. His bitter disappointment had vanished.

"I'll do my absolute best, sir," he said. The colonel's words had crystallized his swiftly-formed animosity for this Thomas Halliday. The man was obviously a timid creature without sufficient guts to do a man's job. Ward felt an itching impatience to get started on this assignment. He wanted to meet Thomas Halliday. He was very anxious to begin his new duties as a spur to the man.

"Halliday hasn't given us much information about what he's discovered on that section of Mars," the colonel said. "He's confined his reports exclusively to atmospheric data. In his

first report he mentioned that the area was inhabited and I got the impression that he hadn't found the natives particularly friendly. But since he hasn't mentioned them since, I gather that he hasn't had any trouble with them. . . .

"I guess that's about all, Lieutenant. This is an important job. And if you find any reason for Halliday's delay in getting that job done, I want you to flash me a message immediately. I'm putting a lot of confidence in you, young man, but I don't think it's misplaced."

The colonel stood up and extended his hand.

"Good luck, son."

Ward took the older man's hand in a firm grip.

"Thank you, sir. I'll do everything I can to justify your confidence in me."

He saluted, right-about-faced smartly and strode toward the door. The colonel followed his straight young back with his eyes and there was a smile of pride on his face. Lieutenant Ward Harrison, in the opinion of the colonel, was definitely an excellent addition to the forces of Earth.

Lieutenant Ward Harrison thought so himself, but he would have suffered his tongue to be torn out before admitting it.

THREE days later, at 24:40 inter-Stellar time, Ward Harrison arrived at the Earth observation base located in the uncharted, inaccessible area on the southern plane of the planet, Mars.

As he flashed into the atmosphere of the planet he cut the rear propulsion rockets of his slim single-seater and prepared to land. He sighted the base's small cluster of buildings and the mooring tower in his fore visi-screen and he made quick rapid adjustments on his instrument panel as his slender ship

slanted toward them in a screaming dive. . . .

When the nose of his ship made contact with a mooring socket, he set all instruments at zero. He climbed to his feet and stretched wearily. Then he walked to the sliding side door of the ship, released the air lock and stepped out onto the ramp that flanked the mooring tower.

From this position, some two hundred feet above the ground, he had his first look at the terrain of Mars. Great gray wastelands spread endlessly in all four directions and the only break in this monotony was a low ridge of hills on the far-distant eastern horizon.

Ward shivered slightly. He hadn't been prepared for anything this depressing. The small group of squat buildings beneath him looked like tiny objects adrift in a vast, terrible gray sea.

A man appeared at the door of the central building and Ward felt an idiotic sensation of relief at the sight of a human, moving figure in that dead, silent, gray terrain.

The man waved to Ward and walked from the doorway toward the base of the mooring tower.

Ward descended to the ground in the small cage of the tower elevator. He stepped out onto the soft, flaky soil of Mars as the man he had seen from above came up to the tower.

"Lieutenant Harrison reporting for duty, sir," he said. He saluted and noticed with a certain satisfaction the other's embarrassment at this military recognition which he didn't deserve.

"My name is Halliday," the man said, after a short awkward pause. He extended his hand. "I'm certainly glad to have you here, Lieutenant."

As Ward shook hands, he appraised the man carefully, and found nothing in his examination to change his pre-

viously acquired opinion.

Thomas Halliday was small and stooped, with sallow features and nervously shifting eyes, which looked startlingly large behind thick strong glasses. His hair was thin and faded brown in color. There was a peculiar tight look about his mouth and jaw, as if he were in a continual state of faint exasperation.

This, thought Ward, was the man who had been holding up the development of this area for three years. And, looking at him, it was easy to see why.

Ward had his bag in his hand. Halliday, noticing it, asked, "Did you bring any arms with you?"

Ward patted the raytube in the smart military holster at his hip.

"Just this," he said. He added drily, "Expecting trouble?"

"No," Halliday answered. His eyes shifted from Ward's and swept about in a long inspection of the vast, sprawling, deserted terrain that stretched away on all four sides like a boundless ocean.

"But," he added, "it's when you're not expecting trouble that you're most likely to run into it."

WARD smiled to himself as he followed Halliday's thin stooped figure to the main building, a squat solid structure of heavy *duralloy* steel, with only one door and no windows at all.

The man was obviously a neurotic mass of nerves, or else he was indulging in a bit of melodrama to impress his new assistant.

Halliday stepped aside at the door and Ward preceded him into the hot, sparsely furnished room. Halliday followed him, closing the door behind him and setting the mechanism of a powerful automatic lock before turning to Ward with an apologetic little smile.

"You'll find it rather cramped at first," he said. "I'll sleep out here and you can use the storeroom as a bedroom. That's all the living quarters we have, excepting the kitchen, but I'm sure we'll manage."

Ward set his grip down and glanced about at the chart-covered walls, the plain, badly scuffed furniture and he was not particularly enthused at the prospect of being cooped up in this hot little oven of a room with Halliday.

"What about the other buildings?" he asked. "Surely there'd be room there for me to bunk."

"We use those buildings for equipment," Halliday said. "And besides, this building is safer."

Ward glanced at the little man with a faint, ironic smile.

"Is there something here to be afraid of?" His tone was blandly polite, but he could not completely conceal an undercurrent of contempt.

"I don't mean to alarm you, Lieutenant," Halliday said, "but this area of Mars is not quite the safest place in the universe." He removed his thick glasses with a nervous little gesture and smiled uncertainly at Ward. "I really think it wiser for you to sleep here."

"Unless that's an order," Ward said, "I'd rather sleep in comfort in one of the other buildings and take my chances on your bogey-men catching me."

Halliday replaced his glasses. He was no longer smiling.

"I'm afraid, Lieutenant, you must consider it as an order."

He turned slowly and re-checked the huge gleaming lock on the door, then walked to a littered, dusty desk in one corner of the room and sat down. It was obvious that the discussion was ended.

- Ward shrugged and carried his grip

into a small windowless storeroom that was directly off the main room of the small structure. There were bales of supplies, a cot and a stool. A vague musty odor permeated the air. He tossed his grip onto the cot, stripped off his tunic and walked back into the room where Halliday was seated at his desk.

Halliday looked up with a smile and removed his glasses with a characteristic nervous movement of his thin hands.

"Not exactly the choicest accommodations, eh?" he said, in an attempt at heartiness, which struck Ward as being almost pathetic.

"I'll get by," Ward said. He loosened the collar of his shirt and glanced at the massive steel door, closed and tightly locked. "Any objection to letting in a little air?" he asked. "It's pretty close in here."

HALLIDAY smiled and his eyes flicked to the closed door. He put his glasses on again and spent quite a time adjusting them to his thin nose.

"I'm afraid we'll have to put up with the closeness," he said.

Ward sighed and sat down in a chair facing Halliday.

"You're afraid of something," he said bluntly. "Supposing you tell me about it."

"As a matter of fact, I was meaning to," Halliday said. "You see, on this section we're pretty well isolated from the rest of the Earth stations on Mars. We receive all supplies and mail by a direct materialization unit. No space craft puts in here. We're here all alone and if anything happened to us all the data and work that has been compiled might be lost."

As Halliday removed his glasses again with a quick aimless gesture, Ward thought, "A lot you care about the records and data. It's your skin

you want to save."

Halliday coughed and replaced his glasses.

"This area is inhabited by a species of creature which I do not believe has been classified. I do not know if they are human or if they possess intelligence. I do not even know if they are 'alive' in the sense that we speak of life. Possibly their energy is of electrical or carboniferous origin, or it could be even vegetable in nature. As you see I know little enough about these neighbors of ours, but I do know that they are dangerous. They resent the work that is being done here." Halliday frowned and twisted a pencil in his hands. "I'm not even sure of that. Possibly they are without rational motivation at all. It may be that they are merely moved to action by the sight of another object in motion. But whatever their reason, they have been very troublesome. That, really, is all I know about them. And that is the reason that I exercise such care. I have a small periscope installed on the roof and before I unlock the door I study the entire surrounding terrain to be sure there are no Raspers in sight."

"Why do you call them Raspers?" Ward asked.

"Because of a peculiar sound that seems to emanate from them," Halliday explained. "My former assistant and I had to call them something and Raspers seemed as logical as anything else."

"Have you ever seen one of these—er—Raspers?" Ward asked.

"I'm not sure," Halliday said thoughtfully. He removed his glasses again. "I've had two brushes with them, but I'm not sure that I saw them distinctly either time. Possibly the picture that came to my mind, later, was supplied by my imagination. But I know that there is something very re-

pellent and fearsome about them. I felt that much."

Ward crossed his legs and lit a cigarette casually.

"Can these things be killed?" he asked.

"I don't know," Halliday answered. "The two chances I had I was too scared to find out."

Ward felt a cold anger against this man growing in him. This man had been entrusted with the task of surveying the atmospheric conditions of this area—a vital, desperately necessary job—and he was dawdling along, timidly hugging the cover of this fortress because of a stupid, half-imaginary fear of the natives of the area. He felt his cheeks growing hot.

"We can't stay cooped up here indefinitely," he said. "How about the work we're supposed to be doing. Or does that bother you?"

HALLIDAY looked at him queerly and then dropped his eyes. He fiddled nervously with his glasses.

Ward suddenly found the gesture maddening.

"For Pete's sake!" he exploded. "Leave 'em on, or leave 'em off, one or the other. That's apparently your only job here, taking those damn glasses off and putting them back on again."

"I'm sorry," Halliday said quickly, apologetically. "It's just a habit I guess. It's a little something to break the nervous tension of being here all alone, thinking . . ."

His voice trailed off and his hand moved nervously toward his glasses and then fell back limply in his lap.

"About the work here," he said in a mild, controlled voice, "we are forced to work on a definitely limited schedule. I have field apparatus located at points several miles distant from here.

But we can't venture out to take the necessary readings until the weather is propitious."

"What's the weather got to do with our taking readings?" Ward demanded.

"Simply this: There are certain periods of intense precipitation on this area of Mars. These periods are accompanied by high velocity winds. The atmospheric disturbance reaches monsoon proportions. During such periods, for some reason, the Raspers are exceptionally active. Something in the nature of the monsoon reacts on them with very savage results. They seem to feed on the electric disturbances in the atmosphere. They go wild during these changes in the weather and search for any moving thing to destroy. In some manner they are able to cover enormous distances during the monsoon and they can travel with incredible speed. When a monsoon is threatening I never leave the station."

Ward listened in growing irritation to this explanation.

"How often do you have monsoons here?" he demanded.

"Unfortunately, quite often," Halliday answered. "All of my instruments indicate now that one is brewing. I haven't been able to do more than a few hours of work in the last two months. I've been waiting for the weather to break, but so far it hasn't."

"Do you mean to tell me," Ward said incredulously, "that you've been sitting here, twiddling your thumbs for the past two months because you're afraid to take a chance on a wind blowing up?"

"That is exactly what I mean," Halliday said. "But it isn't the wind I'm afraid of. It's the things that come with the wind that make any field work impossible. I've learned a few things about the Raspers in my three years and one is that it doesn't pay to give them a chance. That's all they need.

That's all they're waiting for."

Ward stood up impatiently and jammed his fists into his pockets. It took all of his self control not to let his anger and contempt for the man explode in roaring fury.

"I can't understand your attitude," he said at last, through tight lips. "I'm green and new here. I don't know anything about the set-up except what you've told me. But I know from your own admission that you've never seen these things you're so mortally afraid of, you've never stood up to them and given them a taste of ray juice to think about, you don't really know anything about them, except that you're terrified of the very thought of them. That isn't a reasonable attitude. Only one kind of man thinks that way, and that's a man without a touch of starch in his backbone, or a bit of honest-to-goodness guts in his make-up. If you want to hug this place like a scared school-girl that's all right, but I'll be double-damned if I'm going to let any superstitious nonsense keep me from doing the job I was sent here to do."

"That is a very brave speech, Lieutenant," Halliday said, "and I admire you for it. But you are going to do as I say in spite of your own opinions. We will stay here and take no unnecessary chances until our instruments indicate that the monsoon weather has passed. That is an order."

WARD choked back his wrath. He glared at Halliday for an instant, then wheeled and strode into the small storeroom that was to serve as his sleeping quarters. He banged the door shut and sat down on the edge of the cot, his fingers opening and closing nervously.

He wasn't sure just what he'd do, but he didn't intend to stand for Halliday's craven policy of hiding in a locked

room, instead of doing the work his country expected him to do. Halliday was a psychopathic case; his mind was full of a hundred and one imagined horrors and they kept him from doing his job. There was little wonder that he had been three years attempting to compile the information that should have been gathered in three months.

The man was so terrified of imagined dangers that he was helpless to act. Ward felt a moment of pity for him, the pity the brave invariably feel for the weak and cowardly. But he also felt a cold and bitter contempt for the man who had allowed his own fear and timidity to hold up the important work of accumulating data on this section of the planet. If he wasn't man enough to do the job, he should have at least been man enough to admit it.

Ward decided that the next day he'd have the thing out. He undressed slowly and stretched out on the narrow cot, but sleep was a long time in coming.

When he stepped from his room the next day he saw that Halliday was standing in the doorway gazing out over the dull gray Martian landscape.

"Aren't you taking quite a chance?" he asked, with heavy sarcasm.

Halliday ignored the gibe. "No. I made a careful check before I released the door lock and opened up. Did you sleep well?"

"Fair," Ward said. "How can you tell the days and nights here? Is there ever any change in the sky?"

Halliday shook his head. "Sometimes it gets a little darker, sometimes it's lighter. When you're tired you go to bed. That's the only standard we have." He shaded his eyes with his hand and stared for a long moment at the bleak, depressing horizon.

Looking over his shoulder, Ward noticed swirling humid mists drifting in

the air and, above, huge massive clouds of dense blackness were gathering. He felt a peculiar electric tightness in the atmosphere.

Halliday closed and locked the door carefully.

"Might as well have breakfast," he said. "There's nothing else we can do today."

"Do we have to stay cooped up here all day?" Ward asked.

"I'm afraid so. This weather is ready to break any minute now, and when it does I intend to be behind a well-locked door."

Ward's lips curled slightly.

"Okay," he said quietly, "we'll wait for the monsoon to blow over. Then, Raspers or not, I'm going to work."

BUT four long days dragged by and there was no indication that the monsoon weather was prepared to break. Low dense clouds were massed overhead and the air was gusty with flurries of humid wind.

Halliday grew increasingly nervous. He spent every waking hour at the periscope in a constant study of the dark horizons and he said little to Ward.

Ward's impatience grew with every inactive moment.

"How much longer are we going to hide in here like scared rats?" he blazed finally. He paced furiously up and down the small room, glaring in rage at Halliday's stooped figure.

Halliday smiled nervously and removed his glasses. His fingers were trembling so violently that he almost dropped them to the floor.

"I can't even guess," he said shakily. "I was hoping that the monsoon would blow over, but I'm afraid we're in for it."

"You've been saying that ever since I arrived," Ward said bitterly.

Halliday was studying a *aerograph* on the wall. When he turned to Ward, his face was gray. His lips were more tightly clamped than ever.

"If anything should happen to our front door lock," he said, "there's an exit we can use in the kitchen. Possibly you've noticed the small door beside the refrigeration and oxygen unit. That leads to a small room that can be locked from the inside. There are supplies there to last a week. I didn't tell you this before because I was afraid it might alarm you."

"Thanks for sparing my feelings," Ward snapped. "But I don't think I'll be needing your cosy little refuge. I've stalled just about enough. I was sent here to do a job and by Heaven I'm going to try and finish it."

He jerked his tunic from the back of a chair and scooped up his raytube and belt. Halliday regarded him in silence as he buckled on the weapon.

"What do you think you're going to do?" he asked at last.

"First I'm going to flash a message to Earth, asking that I be placed in command here," Ward said. He buttoned his tunic swiftly, and his eyes were cold slits of anger as he looked at Halliday nervously fumbling with his glasses. "I was sent here with instructions to find out what the delay was in getting the work done. I've found out to my satisfaction. You've done about one day's work for every month you've spent cooped up in here, trembling every time the wind howled. When I come back I'll have an authorization from GHQ to take over here immediately. Then you and I are going to work and damn the weather. If you don't want to cooperate," Ward slapped the weapon at his hip, "I'll use what force is necessary to make you."

"Please listen to me," Halliday said desperately. "You're impulsive and

reckless and I admire you for it. Sometimes I wish I were more like that. But I know the situation here better than you do. We'd be running a terrible risk trying to work right at this time."

"Sure," Ward said, "We'd be running a risk. That's apparently your entire philosophy. Sit tight, do nothing, because there might be a slight risk involved."

He turned and strode to the door.

"Wait," Halliday cried. "You can't go out now."

Ward disengaged the lock with a swift deft motion.

"Who's going to stop me?" he asked.

Halliday crossed to his side with quick, pattering strides. He grabbed him by the arm and pulled him around.

"Please listen to me," he said imploringly. "I know what I'm talking about. I—"

Ward shook the hand loose and stared coldly into Halliday's, white strained features.

"You're gutless, Halliday," he said in a low tense voice. "Now keep out of my way."

He turned to the door again, but Halliday grabbed him suddenly and pushed him back.

"You're not going to do it," he cried, his voice trembling. "I'm not going to let you."

WARD grabbed the man by his lapels and swung him away from the door. He stepped close to him and his right fist chopped down in a savage axe-like stroke. The short, powerful blow exploded under Halliday's chin. His knees buckled and he sprawled limply to the floor.

Ward stared down at the still form and he felt an instant of regret for striking a man fifty pounds lighter than himself, but he realized that it had been the only course open.

He drew his raytube, inspected it quickly to make sure that it was in perfect order, then swung open the door and stepped out into the gray murkiness of the Martian atmosphere.

The wind had increased to a wild mad scream. Flaky particles of soil stung his face like myriad needle-pricks as he braced himself against the buffeting force of the gale.

He couldn't see more than a few feet ahead of him, but he knew the general direction of the building which housed the materialization unit and he headed that way, bent almost double against the wind.

He heard and saw nothing but the wild wail of the monsoon and the gray swirling murk. There was an awesome feeling in staggering blindly on through a dead gray world of howling dust-laden wind.

He felt as if he were the only person left alive in the universe. But he plowed stubbornly forward. There was work to be done and he felt a grim exaltation in the knowledge that he had enough fortitude to let nothing stop him from doing his job.

Hell! What was a little wind? This thought came to him and he smiled grimly. He'd show Halliday! He'd show 'em all! Nothing was going to stop him!

There was a peculiar crackling sound in the air about him, as if bolts of unseen lightning were slashing through the turbulent atmosphere, but he forged ahead. He knew there was little danger of an electric bolt striking him as long as he was out in the open.

The distance to the goal was not a matter of a dozen yards or so, but it took him fully five minutes to cover the stretch. He had trouble breathing; each breath was snatched from his open mouth by the fury of the wind. And his eyes were rimmed with dust and

streaming from the stinging bite of the flaky soil.

When he reached the wall of the building he was sobbing for breath and blind from the whiplash of the wind. He sagged against the comfortable bulk of the squat, solid structure and wiped at his eyes with a handkerchief, but the wind soon tore the flimsy cloth from his fingers.

There was nothing to do but find the door of the building as quickly as possible. Using his hands as groping feelers he staggered around two corners of the buildings until his fingers closed about a door knob.

The gale was increasing in intensity; the roaring lash of the wind was wild and explosive, as if the floodgates of Nature had swung open to unleash this maelstrom of fury and destruction.

The sputtering crackle of electric energy he had noticed seemed to be swelling in volume, rising steadily in pitch and fury. And then a new sound was added to the hideous cacaphony. Ward heard it faintly at first and it failed to register on his consciousness.

The new sound was an unearthly rasping noise that roared about his head and crashed against his ear drums with terrifying impact. The sound seemed everywhere; it seemed to emanate from the unleashed forces of the storm itself; its marrow-chilling, rasping moan was a demoniacal cry, screaming a weird defiance into the teeth of the mighty monsoon.

WARD, hugging the building, heard the rasping sound, and he remembered what Halliday had told him. Crouched against the side of the structure, listening to that weird, desolate wail of unnameable horror, he felt his heart thudding with sudden fear against his ribs.

The door of the building was jammed.

He slammed his shoulder against its solid unyielding surface again and again—without avail! The harrowing rasping undertone of the crushing gale was growing and swelling—it seemed to be converging on him from all sides, a creation of the gray whining murk of the monsoon.

Ward's hand tightened on the butt of his raytube. He wheeled about, pressing his back to the wall of the building. His eyes raked the swirling turbulence of the storm.

And through the raging, eddying mists of gray his wind-lashed eyes made out dreadful, weaving shapes, slithering through the fury of the storm—toward him!

An instinctive scream tore at the muscles of his throat, but the wind whipped the sound from his mouth and cast it into the gale before it could reach his ears.

He crouched and raised his gun.

The shapes were vague misty illusions to his straining eyes. Then a blanket of wind swept over him, buffeting him against the wall at his back, and in a monetary flick of visibility that followed the blast, he was able to see the *things* that were advancing toward him.

There was one nauseous, sense-stunning instant of incredible horror as his eyes focused on the nameless monstrosities that were revealed in the gray mists of the monsoon.

One instant of sheer numbing horror, an instinct a billion years old, hurried beneath centuries' weight in his subconscious, suddenly writhed into life, as pulsing and compelling as the day it had been generated.

The lost forgotten instincts of man's mind that warn him of the horror and menace of the unknown, the nameless, the unclean, were clamoring wildly at his consciousness.

For these *things* were hideous and repellent in their very essence. Whether they were alive or not, his numbed, horror-stunned brain would never know. The dry, rustling rasping sound that emanated from them seemed to partake of the same nature as the electrical energy generated by the monsoon, but that was only a fleeting, terror-strained impression.

The raytube fell from his palsied hand; but he didn't notice. There was only one blind motivation governing his thoughts.

And that was flight!

The unreasoning terror of the hunted, of the helpless, gripped him with numbing force. There was no thought in his mind to fight, to face these things that emerged from the dead grayness of the monsoon, but only a hideously desperate desire to escape.

WITHOUT conscious thought or volition his legs suddenly churned beneath him and he lunged forward blindly, desperately, lurching through the buffeting force of the gale toward the sanctuary of the building where he had left Halliday.

The rasping, nerve-chilling sound roared about his head and the lashing screech of the monsoon was a banshee-wail in his ears as he stumbled and staggered on, driven by the wildest, most elemental fear he had ever known.

Suddenly the squat structure loomed directly ahead of him, only a yard away. The door was standing ajar, and, with a broken sob of relief, he lunged into the lighted interior of the room.

Halliday was crawling dazedly to his feet as Ward staggered blindly through the door, his breath coming in great choking sobs.

"My God—"

Halliday's voice broke and Ward saw that his eyes were staring in horror beyond him, to the still open door where the gray swirling fury of the monsoon was creeping in.

And other *things* were in the open doorway!

Ward knew that without turning to look. The horror mirrored in Halliday's face told him that more plainly than could his own eyes.

There was horror and fear in Halliday's face, but the tightness of his lips did not relax into the flaccid looseness of hysteria.

With superhuman control he was keeping a grip on himself.

"Don't move!" he snapped, through set jaws. "I'll try to get at the rifle."

Ward's heart was thundering a tattoo of terror. Halliday's words made no impression on the horror-stunned brain. He lunged wildly across the room, dimly he heard Halliday's sudden shouted warning.

Without a backward glance he lurched into the small room that served as a kitchen. Through the fog of terror that swirled about his mind, he remembered only one thing: Halliday's remark of a refuge built there for emergency purposes.

His fingers tore open the small door alongside the refrigerator unit. A black passage stretched ahead of him and he plunged into dark shelter, jerking the door shut after him.

A light snapped on when the door closed and he saw that he was in a small, stoutly reinforced storeroom, with bales of supplies and equipment packed against the walls.

He threw the heavy bolt that locked the door and sagged against a wall, his breath coming in deep shuddering gasps. There was no sound from outside. Gradually his labored breath-

ing subsided and he stared with dull, unseeing eyes ahead of him.

And in that moment Ward Harrison came face-to-face with what he had done. In a single gleaming flash of understanding, he realized that he had bought his life with his honor.

A shuddering sob passed through his body.

He remembered with scalding self-hatred the things he had said to Halliday—a man who had endured the horror of this isolated base for three years. He had called a man cowardly who had more courage in his smallest finger than Ward had in his entire body.

Halliday had stuck here, doing his job, making no complaints or excuses, always aware of the horrible, soul-numbing danger he was facing.

WARD cursed and buried his face in his trembling hands. With bitter shame he recalled his jeering remarks to Halliday about his nervous habit of removing his glasses.

God! Three years on this hellish base and the only sign a nervous habit of fiddling with his glasses. Stark raving madness would have been the effect on any other person Ward could imagine.

At that instant he despised himself more than he had ever despised any human being in his life.

And he knew that the worst punishment that would ever be meted to him, would be the mere act of living and being able to think—to remember.

With feverish eyes he glared about the room. A small leaden cask was set apart from the other equipment and it was marked with three xxx's, the indication of high explosive contents.

Ward dropped to his knees and pried open the lid of the small cask. It was filled with neat rows of U-235 pellets,

hardly an inch in diameter. He picked up one in each hand and then stood up and walked to the door.

He was beyond thought or reason. He knew he was going to his death and he felt nothing but a numb sense of anticipation. He knew that in dying he would not expiate the crime of cowardice he had committed. Nothing would ever erase the stigma of that shame. A thousand deaths could not do that.

He did not actually think these things. His mind was wrapped in a fog of blind instinct. There was something he must do—do immediately. That was as far as his mind would go.

The kitchen and front room of the small building were empty and the door leading to the outside was open. The wild raging storm of the monsoon blew in the door, whipping papers into the air, resounding against the walls with a booming roar.

Ward strode across the room, bracing himself against the blast of the wind. He stepped through the doorway and the full force of the wind almost bent him backward, but he moved on, fighting his way forward.

After six feet, the building was lost in the grayness. He was again alone in a wild howling world of horror and death.

Then he heard the rasping noise of the *things* directly ahead of him, and an instant later he was able dimly to make out their weaving shapes in the swirling mists of the storm.

The were coming toward him.

WITH a grim exultation pounding in his temples, Ward hurled a pellet of U-235 directly into their midst. The thunderous reverberations of the explosion rocked the ground under his feet. A terrific blast of air that dwarfed the raging turbulence of

the monsoon roared about his head.

He staggered back, almost falling.

When he could see again, he made out a great hole in the ranks of the *things* moving toward him.

His laugh was a wild cry in the fury of the night.

"Damn you!" he shouted.

His arm whipped back and the second pellet crashed into the serried ranks of the deadly rasping creatures.

Something grasped his ankle as the second pellet exploded. He fell backward, striking the ground hard. A hand grabbed his and then, miraculously, incredibly, Halliday was pulling him to his feet, jerking him toward the building.

They stumbled through the door together. Ward fell to the floor as Halliday wheeled and slammed the door, throwing the automatic bolts with the same motion.

Halliday knelt beside Ward.

"Good work," he said huskily. "They were holding me. I don't know what they were planning. Those bombs blew them into little pieces. Luckily I go through the blast all right." He gripped Ward's arm suddenly. "You came through too, son."

"No," Ward said dully. "I didn't. I ran out on you. I'm a fool, a yellow fool."

"A coward wouldn't have come back," Halliday said quietly. "We're going to lick this job together, from now on. We've found a weapon to use against the Rasps. I never thought of high explosives."

He grinned suddenly and the tightness was leaving his mouth. "It doesn't seem so terrible when you've got something to fight back with."

Ward looked up at Halliday and a faint smile touched his own lips. "Someone to fight with, means a lot, too."

he said. He suddenly grinned. "You've lost your glasses."

"I won't miss them," Halliday said. "I didn't need them. I wore them to give me something to do, that's all. But we're going to have plenty to do, now."

Ward swallowed with difficulty. He knew that in his wild, thoughtless act

of heroism he hadn't redeemed himself. Redemption would come from a lifetime of playing the game the way men like Halliday did. But the chance was there for him, and he was glad that he could start immediately.

"Whatever you say," he said. He grinned, and added, "—boss."

THE END

(cont. from page 111)

that the ship was gone, for it was the Institute which had sponsored the expedition. And he had seen other boxes like that piled compactly in the holds of the ship.

Nellon was stunned, crushed. But out of his despair a slow wonder rose. How long had he been unconscious there beside the great green cylinder? The degree to which the snow had blotted out the litter of the camp suggested that it must have been many months. For a moment it seemed incredible that his momentary exposure to the emerald rays of the globe could have produced such a result. Then he remembered the beings, circular row upon circular row of them, lying beneath it, and an awesome knowledge flooded over him.

Those beings were not dead. Exposed constantly to the rays of the globe, they were merely held in a state of slumber, dreaming dreams, undoubtedly, just as curiously real and poignant as his own had been. They were sleeping and dreaming, and the green globe brooded over them like some vast guardian, soothing, nourishing.

And Big Tim slept with them. When they awoke, Big Tim would wake and live again. But he, Nellon, would not live again. Suddenly his fear and hate of the storm returned in full and terrible force. Because when his batteries were exhausted, his suit would cool—and the storm would kill him. Slowly, inexorably, death would come to him. And death was a sleep from which there was no awakening . . .

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THE THIRD MILLENNIUM OPENS

By

ROBERT HEINLEIN

NOW, at the beginning of the year 2001, it is time to see where we have been and guess at where we are going. A thousand years ago Otto III ruled the Holy Roman Empire, William the Conqueror was not yet born, and the Discovery of America was almost five hundred years in the future. The condition of mankind had not changed in most important respects since the dawn of history. Aside from language and local custom a peasant of 1000 B.C. would have been right at home in a village of 1001 A.D.

He would not be so today!

The major changes took place in the last two centuries, but the most significant change of all occurred in the last fifty years, during the lifetimes of many of us. In 1950 six out of ten persons could neither read nor write; today an illiterate person is a freak.

More people have learned to read and write in the past fifty years than in all the thousands of years preceding 1950.

This one change is more world-shaking than the establishment this last year of the laboratory outpost on Pluto. We think of this century just closed as the one in which mankind conquered

space; it would be more appropriate to think of it as the century in which the human race finally learned to read and write.

(Let's give the Devil his due; the contagious insanities of the past century—communism, xenophobia, aggressive nationalism, the explosions of the formerly colonial peoples—have done more to spread literacy than the efforts of all the do-gooders in history. The Three R's suddenly became indispensable weapons in mankind's bloodiest struggles—learn to read, or die. Out of bad has come good; a man who can read and write is nine-tenths free even in chains.)

But something else has happened as important as the ABC's. The big-muscled accomplishments of the past fifty years—like sea-farming, the fantastic multiplication of horsepower, and spaceships, pantographic factories, the Sahara Sea, reflexive automation, tapping the Sun—overshadow the most radical advance, i.e., the first fumbling steps in founding a science of the human mind.

Fifty years ago hypnotism was a parlor trick, clairvoyance was superstition, telepathy was almost unknown, and parapsychology was on a par with phre-

nology and not as respectable as the popular nonsense called astrology.

Do we have a "science of the mind" today? Far from it. But we do have—

A Certainty of Survival after Death, proved with scientific rigor more complete than that which we apply to heat engines. It is hard to believe that it was only in 1952 that Morey Bernstein, using hypnotic regression, established the personal survival of Bridget Murphy—and thereby turned the western world to a research that Asia and Africa had always taken for granted.

Telepathy and Clairvoyance for Military Purposes. The obvious effect was the changing of war from a "closed" game to an "open" game in the mathematical sense, with the consequence that assassination is now more important than mass weapons. It may well be that no fusion bomb nor plague weapon will ever again be used—it would take a foolhardy dictator even to consider such when he knows that his thoughts are being monitored . . . and that assassination is so much harder to stop than a rocket bomb. He is bound to remember that Tchaka the Ruthless was killed by one of his own bodyguard.

But the less obvious effect has been to take "secrecy" wraps off scientific research. It is hard to recall that there was once a time when scientific facts could not be freely published, just as it is hard to believe that our grand-

fathers used to wear things called "swimming suits"—secrecy in science and swimming with clothes on are almost equally preposterous to the modern mind. Yet clothing never hampered a swimmer as much as "classification" hampered science. Most happily, controlled telepathy made secrecy first futile, then obsolete.

But possibly the most important discovery we have made about ourselves is that *Man is a Wild Animal*. He cannot be tamed and remain Man; his genius is bound up in the very qualities which make him wild. With this self-knowledge, bleak, stern, and proud, goes the last hope of permanent peace on Earth; it makes world government unlikely and certainly unstable. Despite the fact that we are (as always) in a condition of marginal starvation, this fact makes all measures of population control futile—other than the ancient, grisly Four Horsemen, and even they are not effective; we finished World War III with a hundred million more people than when we started.

Not even the H-bomb could change our inner nature. We have learned most bloodily that the H-bomb does nothing that the stone axe did not do—and neither weapon could tame us. Man can be chained but he cannot be domesticated, and eventually he always breaks his chains.

Nor can we be "improved" by genetic breeding; it is not in

our nature to accept it. Someday we may be conquered by superbeings from elsewhere, then bred according to their notions—and become dogs, rather than wolves. (I'm betting that we will put up a fight!) But, left to our own resources, improvements in our breed must come the hard way, through survival . . . and we will still remain wild animals.

But we have barely begun to study ourselves. Now that mankind has finally learned to read and write what can we expect him to accomplish?

We have no idea today of how self-awareness is linked to protoplasm. Now that we know that the ego survives the body we should make progress on this mystery.

Personal survival necessitates *Cosmic Purpose* as a "least hypothesis" for the universe. Scientists are tending to take teleology away from theologians and philosophers and give it a shaking. But concrete results this century seem unlikely. As of now, we still don't know why we are here nor what we are supposed to do—but for the first time in history it is scientifically probable that the final answers are not null answers. It will be interesting indeed if one of the religious faiths turns out to be correct to nine decimals.

Since ESP talents seem to be independent of space-time it is theoretically possible that we may achieve a mental form of time travel. This is allowable under the mathematics being devel-

oped to describe mind phenomena. If so, we may eventually establish history, and even prophecy, as exact sciences.

On the physical side we can be certain that the speed-of-light barrier will be cracked this century. This makes it statistically likely that we will soon encounter races equal or superior to ourselves. This should be the most significant happening to mankind since the discovery of fire. It may degrade or destroy us, it may improve us; it cannot leave us unchanged.

On the mundane side we can expect a population of five billion by the middle of this century. Emigration to other planets will not affect the total here.

Scientific facts will continue to be discovered much faster than they can be classified and cross-referenced, but we cannot expect any accompanying increase in human intelligence. No doubt the few remaining illiterates will continue to be employed in the subscription departments of periodicals; the same bigmouths who now complain about rocket service to Luna (but who can't thread a needle themselves) will in 2050 be complaining about service to the stars (and they still won't be able to thread a needle).

Unquestionably the Twentieth Century will be referred to as the "Good Old Days," we will continue to view with alarm the antics of the younger generation, and we probably will still be after a cure for the common cold.

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
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